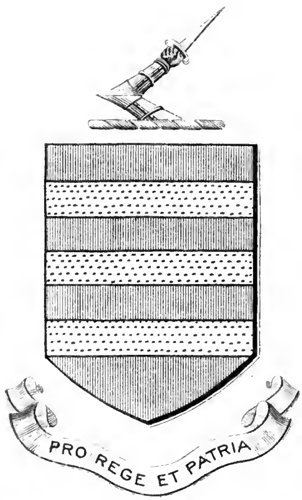
PRO REGE ET PATRIA

THE

LONDON DISPENSATORY,

CONTAINING

I. THE ELEMENTS OF PHARMACY.

II. THE BOTANICAL DESCRIPTION, NATURAL HISTORY, CHYMICAL ANALYSIS, AND MEDICINAL PROPERTIES, OF THE SUBSTANCES OF THE MATERIA MEDICA.

III. THE PHARMACEUTICAL PREPARATIONS AND COMPOSITIONS OF THE PHARMACOPŒIAS OF LONDON, OF EDINBURGH, AND OF DUBLIN.

THE WHOLE FORMING

A PRACTICAL SYNOPSIS OF MATERIA MEDICA, PHARMACY, AND THERAPEUTICS:

ILLUSTRATED WITH MANY USEFUL TABLES,

AND WOOD-CUTS OF THE PHARMACEUTICAL APPARATUS.

BY

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FELLOW OF THE MEDICAL, THE SPECULATIVE, AND THE ROYAL PHYSICAL SOCIETIES OF EDINBURGH;
THE SOCIÉTÉ D'ÉMULATION DE PARIS, AND THE SOCIÉTÉ DE MÉDECINE DE MARSEILLES.

Ninth Edition.

LONDON:
PRINTED FOR
LONGMAN, ORME, BROWN, GREEN, & LONGMANS,
PATERNOSTER-ROW.
1837.

TO

SIR JAMES MACGREGOR, BART.

M.D. F.R.S.

FELLOW OF THE ROYAL COLLEGES OF PHYSICIANS

OF LONDON AND EDINBURGH;

PHYSICIAN EXTRAORDINARY TO THE KING;

AND

DIRECTOR GENERAL OF THE ARMY MEDICAL DEPARTMENT,
&c. &c. &c.

AS

A TESTIMONY

OF RESPECT AND ADMIRATION

FOR HIS ARDUOUS AND WELL DIRECTED EFFORTS

TO PROMOTE

THE CULTIVATION OF GENERAL SCIENCE IN

THE PUBLIC DEPARTMENT UNDER HIS CONTROL;

AND, CONSEQUENTLY,

TO ELEVATE THE CHARACTER OF

THE MEDICAL PROFESSION,

THIS VOLUME IS INSCRIBED,

BY

HIS FRIEND,

THE AUTHOR.

ADVERTISEMENT.

The author expected that the new edition of the London Pharmacopœia would have been, by mutual concurrence of the three British Colleges of Medicine, a National work, a British Pharmacopœia, free from many obsolete and useless articles of the Materia Medica, and a repository of all that has been found really useful. In these expectations, he has been disappointed; the London College has sent forth their new Pharmacopœia, independent of the other two Colleges. Although in many respects the present edition of the London Pharmacopœia is superior to its predecessor, yet it is far from being worthy of the present advanced state of medical science. The author has endeavoured in this edition of the Dispensatory to give all the new information which he has been able to collect, of a chymical kind, in connection with the pharmacy of the volume, and also in reference to the Natural History of the drugs. The importance of the latter is beginning to be properly appreciated, and the words of Celsus to be verified, "Naturæ rerum contemplatio, quamvis non faciat Medicum, aptiorem tamen medicinæ reddit."[1]

[1] De Medicina, Lib. i. in Procem.

De Medicina Lib i

PREFACE

TO THE FIRST EDITION.

THE unnecessary multiplication of books on the same subject may be said, with propriety, to be a great evil; and, therefore, in undertaking the compilation of the following Work, which in its arrangement and plan coincides very closely with the Edinburgh New Dispensatory, it has been my endeavour to render it essentially so different from that work, as to prevent it from being placed under this reproach. But the plan of that volume, which is nearly the same as was originally adopted by Dr. Lewis, with some little alterations, has become so familiar to the profession, and is so well adapted for the purposes of a Dispensatory, that I have thought it prudent not to deviate from it. I trust, however, that the alterations and the additions which I have introduced, particularly in the history of the different articles of the Materia Medica, will give a legitimate value to the London Dispensatory; and, without a wish to detract from the high character of its precursor, will enable it to excite a new interest in the branch of the science of medicine of which it treats; and especially to turn the attention of the student towards Medical Botany, which has been so unaccountably neglected, as to be almost regarded as unnecessary in the education of a physician. Indeed, although it has always been admitted that a correct knowledge of Materia Medica and Pharmacy can be obtained by those only who possess a previous knowledge of Botany and Chemistry, yet neither the Dispensatories nor the systems of Materia Medica published in this country have described plants in a scientific manner; or noticed, in their descriptions, those characteristics which botanists have fixed on as the only means by which a plant, that is not familiar to the reader of a description of it, can with certainty be known, when he wishes to possess it, or is in any doubt regarding it when it is obtained. From the want of this degree of accuracy in the descriptions of plants, many valuable remedies, used by the inhabitants of one part of the world, have been lost to those of another part, where they are, nevertheless, indigenous; or, instead of the proper plants, other species of the same genera, which possess little or no virtue, have been employed; and even plants, not in any respect medicinal, but highly deleterious, have been used as remedies, merely from their bearing names in common or in pharmaceutical language similar to those of some medicinal plants. To prevent this evil, therefore, I have added to the usual account of each vegetable substance the characters of the genus to which the plant belongs, as they are given by Willdenow, in his excellent edition of the *Species Plantarum;* and have also given detailed descriptions of each in the language employed by modern botanical writers.

In the performance of the task of compilation, I have endeavoured to bring together as much useful information, regarding each of the substances treated of, as could be crowded into a small space; and to obtain it have had recourse to every work of reputation to which I could gain access. For the liberality of Sir Joseph Banks, who, through the kind interference of Dr. Gartshore, opened to me the door of his princely collection, I have to return my most grateful thanks; as I obtained information there which I could not otherwise have procured, and some which has never before, I believe, been given to the public in an English garb. Of this nature, in particular, are the observations of Zea on the medicinal species of Cinchona, extracted from the *Annales de Historia Natural;* those of Humboldt on the same subject, and on some other South-American plants, from his splendid work entitled *Plantæ Æquinoctiales;* and Willdenow's description of the Heracleum gummiferum, which I have translated from the *Hortus Berolinensis.* Information has also been sought for, and obtained, from other sources besides books: and I have received from individuals engaged in the drug trade some notices regarding the forms in which drugs are imported, and the modes of selecting them; which I hope will prove useful.

The botanical descriptions of the plants have been selected chiefly from *Martyn's edition of Miller's Gardener's Dictionary;* the last edition of *Woodville's Medical Botany; Smith's Flora Britannica; Sowerby's English Botany;* the *Flora Peruviana; Rheede's Hortus Malabaricus;* and the *Flora Danica;* but in every instance when the living plants could be obtained,—which was the case with the greater number of the indigenous plants, and many exotics also,—the descriptions have been either drawn up from nature, or those adopted have been carefully compared with the plants themselves, and any errors corrected. For other information on this part of the subject, the excellent work of *Gærtner de Fructibus; Bergius' Materia Medica a Regno Vegetabili; Murray's Apparatus Medicaminum; Alston's Materia Medica;* and the *Linnean* and the *Philosophical Transactions*, with the best books of travels, have been consulted.

For the chymical part I have principally consulted the last editions of the *System of Chemistry of Dr. Thomson*, and that of my very ingenious friend *Dr. Murray;* the *Annales de Chimie et de Physique;* the *Philosophical Transactions;* and the best chemical papers inserted in the periodical publications; nor have I refrained from taking advantage of the observations of Dr. Duncan contained in the *Edinburgh New Dispensatory.*[1] As this is undoubtedly the most import-

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[1] The following are the more important of the additional works which have also been consulted: —

Flore du Dictionnaire des Sciences Médicales, décrites par F. P. Chaumeton, Chamberet et Poiret. 8vo. Paris.

Histoire Nat. ed Méd. des Cases, &c.: L. T. Calloden de Genève, M.D 4to. Montpelier, 1816.

Materia Medica of Hindostan, &c. &c. By Whitelaw Ainslie, M.D. 4to. Madras, 1813.

A Treatise on the Medicinal Leech, &c. &c. By T. Johnson, M.D. 8vo. London.

The author, in addition to the above works, has used freely the elementary volume of his late friend and colleague Dr. Ed. Turner; Drs. Trousseau et Pidoux, *Traité de Thérapeutique,* 8vo. tomes ii. Paris, 1837, and *Journal de Pharmacie.*

Mém. de la Société Impériale des Nat. de Moscow, 4to. Moscow, 1809.

Asiatic Researches, 4to. Calcutta.

ant part of the work, I have given it all the attention I am possessed of; and although it would be almost impossible, and altogether unnecessary, to prove by actual experiment the correctness of all the formulæ for the preparations and compositions ordered in the Pharmacopœias, yet the greater part of those ordered in the London Pharmacopœia, which I have chosen for my text book, have been repeated, and an unrestrained opinion regarding them delivered. Those chemical theories only, however, which are fully established have been adopted; and I have studiously avoided ranking myself on either side, on the important questions now at issue, suggested by the late investigations of Mr. (now Sir. H.) Davy.[1]

With regard to the reformed nomenclature of the Pharmacopœias, the entire principle of which has been strongly objected to by Dr. Bostock, in his *Remarks on the Nomenclature of the London Pharmacopœia*, I conceive it to be my duty to state here, that although I have not scrupled freely to criticise such names as appear to me to be improper in the work of the London College, and incompatible with the views of the subject which it professes to have taken, yet I do not concur with that gentleman in thinking that the reform was

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Tableaux Chimiques du Règne Animal, &c. par Jean-Frédéric John, &c. *traduit de l'Allemand*, par Stephane Robinet, 4to. Paris, 1818.

Annales de Chimie et de Physique, 8vo. Paris.

Henry's Elements of Experimental Chymistry, 7th edit. 8vo. London.

Elementi di Chimica Farmaceutica e d'Istoria Naturale, &c. 8vo. Torino.

Nouveaux Elémens de Thérapeutique et de Matière Médicale, &c. par I. L. Alibert, 8vo. 4me. edit. Paris, 1817.

Farmacopea Generale ossia Dizionario delle Preparazioni Farmaceutico-Mediche, &c. di L. V. Brugnatelli, 8vo. Pavia, 1814.

Traité des Poisons, &c. &c. par M. P. Orfila, 8vo. Paris.

Phillips's Remarks on the Editio Altera of the Pharm. Lond. 8vo. London.

Journal de Pharmacie et des Sciences Accessoires, &c. 8vo. Paris.

Journal of Science and the Arts, 8vo. London.

The Annals of Philosophy, 8vo. London.

Medico-Chirurgical Transactions, 8vo. London.

The London Medical Repository, 8vo. London.

Bancroft's Philosophy of Permanent Colours, 2d edit. 8vo. London.

Lambert's Illustrations of the Genus Cinchona, 4to. Lond. 1821.

Burckhardt's Travels in Nubia, 4to. Lond. 1820.

Davy's Account of the Interior of Ceylon, 4to. Lond. 1821.

Humboldt's Personal Narrative, 8vo. Lond. 1821.

Opium Historice, Chemice atque Pharmacologice Investigatum, per C. A. Christen, 8vo. Vind. 1820.

Pharmacologia, &c. &c.: 3d edit. 8vo. Lond. 1820.

Pharmacopœia Batava et Notis, &c. Lipsiæ, 1824.

[1] The establishment of Sir H. Davy's theories has rendered the reserve implied in this sentence no longer necessary.

unnecessary, or now, when it is accomplished, that it is not likely to be generally adopted. It is, indeed, deeply to be lamented, that a work issuing from so respectable and learned a body as the London College is acknowledged to be, is not more perfect in its execution: but, nevertheless, its nomenclature is much superior to that of its predecessor; and within the scope of my own observation, as well as from information which I have received from others, it is now coming into very general use. Many of the older physicians already write their prescriptions in the reformed language; and it is so congenial with the habits of thinking, and the ordinary language and mode of writing of the younger practitioners, that there is no doubt of its being readily adopted by them.[1]

The best authors have been consulted regarding the medicinal properties and uses of the various substances treated of; but I must confess that less attention has been given to this, as it is not intended that the practice of medicine should be taught by a Dispensatory; and surely little is to be expected from those who would attempt to acquire it from such a source. As memorandums, however, I have been anxious to make the medical notices as correct as possible; and have, in most instances, given references to the works from which the best information on this part of the subject may be obtained.

After all my efforts, however, to avoid errors, I am sensible that the work may, nevertheless, contain many; I have, therefore, determined to lend a willing ear to the remarks of candid criticism; and, in future editions, to take advantage of every suggestion that may tend to bring it nearer to that state of perfection, the attainment of which must afford more satisfaction to an author than all the indiscriminate praise which can be lavished upon his labours. I might, indeed, plead as an apology for its imperfections, that the work has not been prepared in the repose of retirement, and with an abundance of leisure; but, on the contrary, that I have been able to bestow

[1] The experience of years has fully confirmed these anticipations.

on it the few leisure hours only which I could snatch from full employment in a laborious branch of the profession, and during the wasting of the midnight oil, amidst inconvenience and anxieties; and with the perpetual annoyance of professional interruptions. I am sensible, however, of the futility of such an apology; and as the book is now in the hands of the profession, it must fall or rise according to its merits. I can only hope these will be justly appreciated by the Public, that tribunal, by which every production, whether of intellect or of labour, must be ultimately judged.

ANTHONY TODD THOMSON.

91. *Sloane Street,*
April, 1811.

Explanation of the abbreviations employed in the synonymes; and the chymical symbols.

(*F.*) French.
(*G.*) German.
(*I.*) Italian.
(*S.*) Spanish.
(*Dutch.*)
(*Swed.*) Swedish.
(*Dan.*) Danish.
(*Pol.*) Polish.
(*Port.*) Portuguese.
(*Russian.*)
(*H.*) Hindoostanie.
(*San.*) Sanscrit.
(*Tam.*) Tamool.
(*A.*) Arabic.
(*Pers.*) Persian.
(*Beng.*) Bengalese.
(*Duk.*) Dukhanie.
(*Malay.*)
(*Cyng.*) Cynghalese.
(*Celebes.*)
(*Jav.*) Javanese.
(*Esqui.*) Esquimaux.
(*Chin.*) Chinese.

Chymical Symbols.

Aluminium (Al).
Ammonia (Am).
Antimonium (Sb).
Arsenic (As).
Barium (Ba).
Bismuth (Bi).
Boron (B).
Bromine (Br).
Calcium (Ca).
Carbon (C).
Chlorine (Cl).
Copper (Cu).
Cyanogen (Cy).
Hydrogen (H).
Iodine (I).
Iron (Fe).
Lead (Pl).
Magnesium (Mg).
Manganese (Mn).
Mercury (Hy).
Nitrogen (N).
Oxygen (O).
Phosphorus (R).
Potassium (K).
Silver (Ag).
Sodium (Na).
Sulphur (S).
Water (Aq).
Zinc (Zn).

Two equivalents of a substance may be denoted by a dash under the symbol $\underline{\text{H}}$. $\underline{\text{P}}$. $\underline{\text{S}}$. Compounds are marked as follows: — $\overset{\cdot\cdot\cdot\cdot\cdot}{\text{N}}$ nitric acid, $\dddot{\text{S}}$ sulphuric acid, the dots above the symbol showing the quantity of oxygen in the acid: or $\dot{\text{K}}\ \dddot{\text{S}}$ — $\dot{\text{Ca}}\ \ddot{\text{C}}$ — sulphate of potassa, carbonate of lime. When there is more than one equivalent of the constituent of a compound, it is marked thus: — N H^3, ammonia; N C^2, cyanogen; $\text{H}^3\ \text{C}^2\ \text{O}$, alcohol. The vegetable acids are denoted by a dash over the first letter of their names: — $\overline{\text{A}}$, acetic acid; $\overline{\text{B}}$, benzoic acid; $\overline{\text{C}}$ citric acid, and so on.

CONTENTS.

Aspalathus canariensis [illegible]

THE

LONDON DISPENSATORY.

PART I.

ELEMENTS OF PHARMACY.

PHARMACY is that branch of the science of chymistry which relates to the combination and mixture of different substances, for the purposes of medicine.

Its practice presupposes a knowledge of the ultimate principles of the substances employed in its operations, and of their chymical agencies; thence, of the general doctrines of Chymical Science. The elements, therefore, of Pharmacy, properly speaking, are those of Chymistry; and without a knowledge of these, Pharmacy can neither be theoretically understood, nor advantageously practised as an art.

As, however, it would be impossible in this place to give more than an outline or epitome of the elements of Chymistry; and as the second part of this work is intended to contain the analysis as well as the history and an account of the uses of the different articles of the Materia Medica which constitute the subjects of Pharmacy, I shall confine the term Elements of Pharmacy to comprehend those general principles of chymical action which enable us to reason on and perceive the proximate causes of the results of pharmaceutical combinations; and to the explanations of the operations of Pharmacy, with a description of the apparatus.

TABLE OF ARRANGEMENT.

SECTION I.

THE agents which more generally influence chymical, and, thence, pharmaceutical combinations, are *Attraction and Repulsion.*

I. ATTRACTION.

ATTRACTION is the term employed to denote that power which causes bodies to approach towards each other, and which preserves them in a state of union after they come into contact. We are ignorant of the cause of this power, but some of the laws respecting it are sufficiently evident: and, from observing the different phenomena to which these give rise, we are inclined to believe that there are different species of attractions, although, perhaps, the difference is more in degree than in kind.

When this power is exerted on masses of matter, at sensible distances, in the direct ratio of the quantity of the matter, and the inverse ratio of the square of the distance, it is named *Gravitation;* but when its operation is confined to the minute atoms of bodies, and is exerted only when these are near to each other, or in apparent contact, it is denominated *Contiguous Attraction.* The former causes bodies on this globe to fall in a line perpendicular to its surface, preserves the planets in their orbits, and sustains in their places all the parts of the magnificent frame of the Universe: the second is the cause of the regular figures of natural bodies, and of the various combinations of matter which take place in and upon the surface of our globe. It is this species which we are here to examine.

CONTIGUOUS ATTRACTION, operating on particles of the same kind, forms an aggregate or mass; and the power, in this instance, is named the *attraction of aggregation,* or *cohesion;* but, acting on dissimilar particles, and producing bodies possessed of new properties, different from those of their components, it constitutes *chymical attraction,* or *affinity.*

a. OF COHESION.

The attraction of *Cohesion* is that force which retains together the particles of bodies at insensible distances. According to the degree of force which it exerts, substances assume the solid, the fluid, or the aëriform state.

1. In *solid* bodies this force is sufficiently powerful to prevent their component particles from being moved with regard to one another, except in a very small degree; and to oppose a considerable resistance to any mechanical power applied to separate them. In the same kinds of bodies, all the circumstances being equal, it is always the same; but in dissimilar bodies it is exceedingly various: from which, and the peculiar arrangement of the particles, arise the different qualities of solids, denominated hardness, softness, malleability, ductility, and elasticity.

The attraction of cohesion in solids is exerted at insensible distances only, and may be weakened or altogether overcome by caloric, or that matter which produces the sensation of heat. If a piece of ice, for example, be brought near a fire, the cohesion of its particles is weakened as the caloric flows into it, till it is changed from the solid state to the fluid state, or water; and by continuing and increasing the heat, the particles are still further separated from one another, until the fluid passes into the gaseous form, or becomes steam. This power is also weakened by chymical affinity; for, when a solid body is put into a fluid, the affinity between the particles of the fluid and those of the solid is often sufficient to overcome the aggregation of the solid; and its detached particles, being uniformly diffused through the fluid, now form a part of it, without altering, or not greatly altering, either its fluidity or its transparency. This constitutes the ordinary chymical or pharmaceutical process of *solution*, which is always favoured by the application of heat, owing to the assistance which it affords in overcoming the cohesive attraction, as has been already noticed.

2. In *liquid* bodies this force also operates, but in a less degree than in solids, their particles being at greater relative distances, and moveable with regard to each other by a very small force; but as their mobility does not change their relative distances, they remain within the sphere of this attraction, and are kept together. The exertion of this power varies in different liquids: it is greater in mercury than in water, and in this than in alcohol. It offers, however, scarcely any resistance to the combination of fluids with other bodies; and, thence, the mutual affinity of two bodies is always favoured when one of them is in the liquid state. Between bodies that do not combine when they are mixed in a liquid state, there is little or no affinity.

3. This attraction is not exerted over *aëriform* substances; for while these remain at the temperature necessary for the preservation of their aërial state, their particles mutually repel each other, and would recede to an indefinite distance, were they not prevented by the pressure of the surrounding bodies. Thus, a portion of air which can be contained in a vessel of 1 cubic inch of capacity, will fill a vessel of 100 cubic inches of capacity, if the pressure which confines it within the smaller vessel be removed.

One of the most important results of this variety of contiguous attraction, in a pharmaceutical point of view, is the formation of crystals, or the regular, geometric, and determinate figures assumed by many bodies in passing from the fluid to the solid state, when nothing opposes the union of their particles according to the laws of aggregation.

The process of *crystallization* requires that the particles of the substance to be crystallized be moveable; and, consequently, in order to obtain any body in a crystalline state, it must first be rendered fluid, either by solution in a liquid, or by fusion.

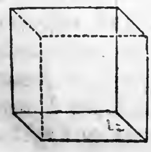
The crystallization of salts is usually effected in the first method. When a salt is much more soluble in hot water than in cold, as is the case, for example, with sulphate of soda, nothing more is required for its crystallization than to saturate hot water with the salt, and set the solution aside to cool.

As the caloric is dissipated, the saline particles gradually approach one another, and uniting, owing to the power of cohesion overcoming that of the affinity of the liquid for the salt, they form solids of a regular shape, the crystals of this peculiar salt. But, when the salt is one which is almost equally soluble in hot and in cold water, as sea salt (chloride of sodium), for instance, its crystallization can be effected only by evaporating a part of the fluid: and the more slowly the evaporation proceeds, the mutual attraction of the particles is more regularly effected, and the more definite is the shape of the crystals which are obtained. In both cases, however, the attraction of the saline particles for one another at length ceases to act, while, the affinity of the fluid for them remaining the same, it holds as much saline matter as it can preserve dissolved at the temperature of the atmosphere, or is a saturated solution; but, by a great reduction of temperature in the one case, and a further evaporation in the other, it will again yield crystals.

By *fusion*, bodies which are not soluble in water, as glass, metals, sulphur, &c. are enabled to assume the crystalline form. In this case, the body is, as it were, dissolved in caloric: and the particles being separated from one another, these, when the cooling is gradual, assume, in aggregating again, the regular arrangements which take place in crystallization. This mode of crystallizing substances is seldom used for pharmaceutical purposes.

Crystallization is promoted or retarded by various circumstances, to be afterwards noticed. (See *Section* iii.) Its theory is still obscure; but some light has been thrown upon it by the experiments of Haüy. He found that crystals may be mechanically divided, and reduced to certain primitive forms, which are always the same in the same kind of substances, and depend upon the figure and the mode of combination of the integrant particles composing the crystals. The varieties of figure of these particles, notwithstanding the great diversity of crystalline forms, are reducible to three: namely, 1. the parallelopiped, the faces of which are six, parallel two and two; 2. the triangular prism; and, 3. the tetrahedron, or four-sided pyramid; and these particles, therefore, according to the mode in which they unite, which may be either by their faces or their edges, form primitive crystals, which are the nuclei of the secondary crystals. The forms of primitive crystals may be reduced to the following six:—1. the parallelopiped, which includes the cube or hexahedron, *a*, consisting of six faces or planes, all the eight angles of the twelve edges of

a



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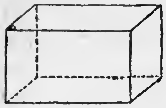

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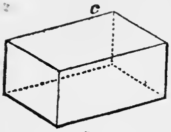

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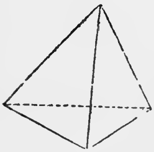

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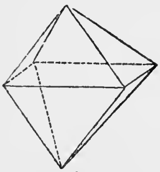

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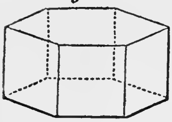

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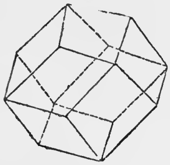

which are equal to 90 degrees;—the right square prism, *b*, differing from the cube by its four lateral planes being rectangles, whilst the terminal planes are square;—the right rhombic prism, *c*, the terminal planes of which are rhombs, and all solids terminated by six faces, parallel two and two. 2. the regular tetrahedron, *d*, which consists of four equilateral triangles. 3. the octohedron, with eight equilateral triangular faces, *e*, all the plane angles of which are equal to 60 degrees. 4. the hexagonal or six-sided prism, *f*, the lateral planes of which incline to each other at an angle of 120 degrees; and, 5. the dodecahedron, *g*, the faces of which incline to each other at the edges at an angle of 120 degrees. The variations of the forms of secondary crystals are considerable in the same salt, and depend, in general, either on variations in the proportions of the ingredients which compose the integrant particles, or on the properties of the solvent in which the crystals are formed. Thus, alum crystallizes in octohedrons, but the addition of a little alumina produces cubes; and an excess of this earth prevents crystallization altogether: thus, also, chloride of sodium, which crystallizes in cubes when dissolved in water, assumes the regular octohedral form when it is crystallized in urine. Independent, however, of these causes, a variety of secondary forms make their appearance; which the theory of Haüy explains, by supposing, that,—as the matter which envelopes the primitive nucleus to form a secondary crystal is attracted in thin layers, each layer decreasing in size in consequence of one or more rows of integrant particles being abstracted from its primitive edges or angles,—the decrements may be on the *edges* of the slices, which correspond with the edges of the primitive nucleus: or on the *angles*, that is, parallel to the diagonals of the faces of the primitive nucleus; or the decrements may be *intermediate*, parallel to lines situated obliquely between the diagonals and edges of the faces of the primitive nucleus. It would be impossible, however, to give a satisfactory view of this ingenious theory in the narrow compass of this epitome; and therefore I must refer the reader to Brooke's *Familiar Introduction to Crystal-*

lography; Mohs's *Treatise on Mineralogy*, by M. Haidinger; Haüy's *Traité de Minéralogie*, tomes 1. and 2.; to the *Annales de Chimie*, tom. 17.; and the third volume of the fifth edition of Thomson's *System of Chymistry*.

Such is the Attraction of Aggregation, and its general effects. It is frequently concerned in modifying pharmaceutical results; but it is a power of much less importance than the next variety of *contiguous attraction*, namely,

b. CHYMICAL ATTRACTION, OR AFFINITY.[1]

Chymical attraction, or *affinity*, is that power by which dissimilar substances placed under certain circumstances are enabled to unite, and form new aggregates, in which the properties of the component particles are lost or changed. Its action is confined to the minute atoms or ultimate particles of bodies, and is exerted only at insensible distances or the closest proximity: not indifferently, however, but electively, between the particles of all bodies. The result of its operation is a *combination* of the constituent particles of the substances, so intimate that the components cannot be recognised, nor separated by any mechanical force. Thus, lime acts as a powerful caustic when applied to animal matter, and is partially soluble in water; phosphoric acid has an acid taste, and is very soluble in water; but phosphate of lime, the compound produced by the chymical combination of these substances, is inert when applied to animal matter, insipid, and insoluble in water; and cannot be again resolved into lime and phosphoric acid by any mechanical power.

Chymical combination, therefore, is the result of the affinity of two or more substances for each other. It differs from *mixture*, in which the substances are only blended without acquiring any new properties, and in which the dissimilar parts are easily discovered, and may be separated by mechanical powers. Chymical compounds can, however, be decomposed, either by exposure to a high temperature, which weakens the force of attraction existing between their principles; or by mixture, under favourable circumstances, with some other chymical agent, which has a more powerful affinity for one of the components than these have for each other; thus, if a solution of camphor in alcohol be poured into water, the alcohol, having a stronger affinity for water than for camphor, leaves the camphor to unite with the water, and thus sets the camphor free. In operating by such means, which

[1] For many of the following observations on affinity I am indebted to the remarks of my late respected friend Dr. Murray: see his *System of Chymistry*, vol. i.

constitute *chymical analysis*, the principles of a compound may be ascertained.

As *Analysis* separates compounds into their constituent principles, so *Synthesis* may re-produce them by re-combining these principles; and when this can be effected, it is the surest proof of the accuracy of any analysis. In many instances, however, this is impossible; and the evidence of the truth of an analysis is to be drawn from other sources.

It is an acknowledged law of chymical affinity, that a compound "does not possess properties merely intermediate between those of its component parts, but has acquired others more or less new." One of the most general changes is that of form. The combination of two gases, for example, *muriatic gas* and *ammoniacal gas*, forms a fluid; that of two fluids, again, may form a solid, as is demonstrated by dropping into a saturated solution of *muriate of lime* some concentrated *sulphuric acid;* and the common process of *solution* presents to us the fact, that, by the combination of a solid with a fluid, the solid assumes the fluid form. In the last-mentioned instance the fluid is generally regarded as the active substance; but, nevertheless, the attraction of affinity is reciprocal; and, thence, the general mode of expressing the fact, that the fluid dissolves the solid, or is the *solvent* or *menstruum*, is, in strict language, erroneous. These terms, however, are more correctly applied, when the properties of the solid, except form, are scarcely sensibly altered; as, for example, when common salt, chloride of sodium, is dissolved in water.

Chymical combination produces an alteration of *density*—that of the compound not being the mean of the components, but often different. In the greater number of cases the density is increased; and there is a diminution of volume, owing, probably, to the compound atom being of a form admitting a more compact aggregation than the component atoms in their separate state; but the specific gravity of a compound cannot be determined by calculation from the specific gravity of its ingredients. There are cases of combination, however, in which the density is diminished, and there is an increase of volume in the resulting compound: for instance, when a solid is dissolved by a liquid, the increase of volume acquired by the solid, in passing into the fluid state, may be greater than the condensation resulting from its union in that state with the liquid; and this happens from the solution of a considerable number of the salts in water.

"The exertion of chymical attraction is generally accompanied by a *change of temperature*." Thus, if four parts of sulphuric acid and one part of water, both at the temperature of 30°, be mixed together, the temperature of the mixture rises to 200°; and the density of the compound is much greater than the mean of the densities of the components. The heat also which is evolved by combustion, and in fermentation, is the direct consequence of chymical combination. In all cases the increase of temperature is accompanied with an increase of density, to which, and the change of form suffered by one or both of the components, its production may be ascribed. Thus, water, which is solidified, or loses its liquid state, by being mixed with quicklime, parts with a large portion of caloric; the contrary effect, however, or an absorption of caloric, is also produced by chymical combination, when the density of the compound is less than the mean; as, for instance, when by solutions of salts in water, or the conversion of some other solids into fluids, very intense cold, greater than any natural cold, is artificially produced.[1]

The exertion of chymical affinity is influenced by various circumstances: these, according to Berthollet, are, *quantity*, *cohesion*, *insolubility*, *specific gravity*, *elasticity*, and *inflorescence*.

1. That *quantity* has a considerable share in influencing chymical affinity was first suggested by Berthollet, who states it as a canon, that combinations do not depend altogether on the attraction of affinity, but on the proportions also of the substances brought into action. Thus, if A and B form a compound, and C be a substance which has a stronger affinity for A than B has, it should be able, when mixed with a compound, to withdraw A altogether from B, if combination was regulated by affinity only: but this, he affirms, is not the case in fact; for C does not entirely combine with A, but is shared between it and B, according to the force of the affinity, and the bulk of each. This view of the subject affords a reason why, in pharmaceutical compositions, a small quantity of a substance may be added to a compound, without producing any sensible effect, although, if added in large quantity, decomposition would directly ensue: thence it follows, 1st, that "the chymical action of one substance on another must diminish as it advances to saturation;" and, 2dly, that a decomposing substance "must oppose a stronger resistance to the decomposing agent, in proportion as the decomposition proceeds, from the increase in the relative quantity of one of its ingredients to the other, which is abstracted;" and lastly, "that, in estimating the relative forces of affinity in bodies, the quantities of them must be taken into account, and ought to be equal." Objections of considerable weight have been advanced to the opinions of Berthollet on this subject, by Pfaff,

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[1] See Appendix to Part I. No. I.

Sir H. Davy, and others; but it is unnecessary to enter into an examination of these at the present moment; and we may only observe, that the theory of Berthollet, however plausible, is not unobjectionable, and also, that it is not in accordance with the results of experiment, as demonstrated by M. Dulong.

2. *Cohesion* has an evident influence in opposing chymical action, and counteracting the exertion of chymical affinity. Thus, all aggregates are more slowly acted on by liquids, in which they are soluble, than when their parts are mechanically divided: and this does not happen altogether from the mere circumstance of a larger surface being presented to the fluid; for native oxide of tin, which, in the aggregate, resists completely the action of any acid, becomes soluble when its aggregation is overcome by mechanical operations: and some other substances are similarly affected.

On account of the influence of mechanical division, we find *trituration*, *levigation*, and *granulation* ranked among pharmaceutical operations. They are of importance "in facilitating chymical action, partly by diminishing aggregation, and partly by increasing the surfaces on which affinity is exerted." In some instances mechanical division is not sufficient, and recourse must be had to precipitation. Thus, liquid potassa will not dissolve silica in powder obtained by trituration; but when the silica is precipitated from a state of chymical solution, it is readily dissolved in liquid potassa.

The force of cohesion may be lessened in two ways: namely, by the power of caloric, and by mechanical division. The first acts by producing liquefaction: for, owing to the force of cohesion, also, solid bodies seldom act chymically on solids; while fluids readily combine with fluids, and likewise act with energy on solids for which they have an affinity. Fluidity, however, is not indispensable to chymical action: there being many cases in which two solids, in a state of minute mechanical division, act chymically on one another.[1] (See *Section* iii.)

When the specific gravities of two fluids are very materially different, their chymical combination is opposed, to a certain extent, by the force of cohesion of the heavier fluid; thence *agitation* is frequently necessary for aiding the operation of affinity.

Cohesion has sometimes a considerable influence in determining the proportion of combination formed in consequence of new affinities. Thus, if its intensity be sufficient to counterbalance the affinity of the fluid in which the integrant

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[1] Thence the axiom *Corpora non agunt nisi sint soluta,* which was formerly established in chymistry, is not generally true.

particles resulting from a new combination are formed, it will combine these, and produce crystallizations or precipitations, which, withdrawing the substance thus formed in part from the sphere of action, and opposing a resistance to any further exertion of chymical power, will, consequently, determine the proportions of the combination.

3. *Insolubility* must necessarily modify chymical action. If an insoluble compound substance be acted on by any substance tending to combine with one of its principles, this is protected, in some degree, by the insolubility of the compound withdrawing it from the action of the decomposing substance; and if a compound, which is produced in the progress of combination, be insoluble, it will be directly precipitated, and thus fixed in its proportions. This is illustrated when a solution of a sulphate of zinc is decomposed by acetate of lead: the sulphuric acid and the oxide of lead are both withdrawn, by their combination forming an insoluble compound, namely, sulphate of lead, whilst acetate of zinc is obtained in solution. In decomposition this is extremely useful; for the insoluble product, being immediately separated, cannot oppose the further action of the decomposing substance, which would be the case were it to remain in solution.

4. *Specific gravity* influences considerably the exertion of affinity, particularly if the substance be of little solubility, by withdrawing it from the sphere of action, and hence retarding its combinations; and in many instances this can be but imperfectly counteracted by agitation.

5. Chymical attraction, as far as the aëriform substances are concerned, is opposed by *elasticity*. Thus, when two gases having mutual affinities are mixed together, they very seldom combine, which is ascribed to the distances between the particles of substances existing in the gaseous state; for, as chymical attraction is exerted at insensible distances only, the particles of the two gases, although mingled together, are yet without the sphere of attraction. That this is owing to elasticity, is evident from the circumstance that the vapours which are not elastic more readily combine. Hence, whatever gives density to highly elastic substances, as, for example, mechanical pressure, or cold to a certain degree, must favour their chymical combination.

6. *Efflorescence* may also influence chymical affinity—a fact which was first observed by Scheele, who ascertained, that if in a paste composed of several saline substances decomposition is going on, one of the resulting compounds often rises through the mass, and forms an efflorescence on its surface; and its being thus withdrawn from the sphere of action, contributes towards forwarding the decomposition.

7. The influence of *temperature* in modifying chymical action is very considerable. An increased temperature, by promoting fusion, and in other respects weakening the attraction of cohesion in solids, favours combination; but opposes it in some cases, inasmuch as it augments elasticity. In both instances its effects are much modified by the degree of its intensity; combinations effected at a lower being often dissolved at a higher temperature, owing to one or more of the components having its affinity weakened by an increased elasticity. Thus, mercury exposed to air, for some time, at a temperature equal to its boiling point, combines with the oxygen of the air, and is converted into red oxide of mercury; but, if the fire be raised so as to make the retort red-hot, this oxide is again decomposed, and running mercury and oxygen gas are obtained.

From the influence of the above circumstances on chymical combination, the utility of those pharmaceutical and chymical operations, which diminish aggregation, overcome the effect of specific gravity, diminish elasticity, and regulate temperature, such as pulverization, trituration, granulation, agitation, and compression, with the proper management of furnaces, is sufficiently obvious.

In that department of pharmacy, also, which regards extemporaneous composition, it is of importance to attend to the slowness with which chymical action is in many instances produced; for substances, which have mutual affinities for each other, may give no indication of any change when newly mixed, but yet, after some time, produce very complete changes. Such compounds, therefore, when they are intended to act *medicinally*, should be exhibited as soon as possible after they are made.

Chymical attraction may be exerted between more than two bodies, so as to bring three or four into one combination; and such compounds are named *ternary*, *quaternary*, &c. according to the number of their components. Several examples of these are to be found among the saline preparations (*Part* iii.); and almost all the vegetable substances are compounds of three or more principles.

The forces with which chymical attraction is exerted are different in different bodies. In cases where this attraction is exerted in a superior degree, by a third body, to that of either of the components of a compound of two bodies, so as to decompose it, and form a new compound, while, at the same time, one of the components of the previous compound is set free, the affinity thus exerted has been termed *single* *elective attraction.* To represent the relative forces of affinity, tables were first constructed by Geoffroy; and afterwards much improved and extended by other chymists, particularly Bergmann. The remarks of Berthollet may have tended to lessen their value in the opinions of some; but their utility to a certain extent must undoubtedly be acknowledged.[1] When the elective attractions are more complicated, or when two elective affinities are exerted, and two new compounds formed, this is termed *double elective attraction.* In such cases, Mr. Kirwan denominated the attractions which tend to preserve a compound in its original state *quiescent;* while the others, which tend to separate the principles of a compound from each other, he termed *divellent attractions.* As an example of double elective attraction, let it be supposed that two compounds in solution, one consisting of potassa and sulphuric acid, or *sulphate of potassa,* and the other consisting of chlorine and calcium, or *chloride of calcium,* be mixed together, a double decomposition will take place, and two new compounds, *sulphate of lime,* and *chloride of potassium,* will be formed. In this case, if the attraction between potassa and sulphuric acid be 62, and that between calcium and chlorine be 20, the sum of the quiescent attractions will be 82; but if the attraction between potassa and muriatic acid be 32, and that between sulphuric acid and lime be 54, the sum of the divellent attractions will be 86; which, exceeding the former sum of the quiescent, will operate and produce the above-stated decompositions and resulting compounds.

According to the opinions of Bergmann, the relative force of the affinities which produce these effects is capable of being measured, and the changes are altogether to be ascribed to the predominance of the affinities of one set of substances over those of another.

But the changes produced by the predominance of certain affinities over others, are ascribed by Berthollet to those circumstances which influence attraction, and limit combination. If four substances, for example, be presented to each other, two of which have a greater tendency to cohesion than the other two have, so as to form by their union an insoluble compound, instead of one compound being formed by the union of the four, in which the affinities are balanced, this will be averted by the force of cohesion, and the two which form the insoluble compound will unite, and be separated by precipitation or crystallization, leaving the other two in combination in the fluid which has been the medium of action. "If even

[1] See Appendix to Part I. No. II.

these four substances were previously in the reverse binary combinations, on presenting them to each other, the affinities within the sphere of action must be reciprocally exerted; and the same extraneous forces will cause an exchange of principles, or the phenomena which have been ascribed to elective affinities will be produced." To avoid the term elective attraction, Berthollet denominates cases of this kind *complex affinity*. The explanation of single elective attraction, or where three substances are presented to each other, is precisely the same; the union which takes place between two of them being determined by the tendency to cohesion, or the disposition of the combination of two of them to form a compound of little solubility.

Elasticity, likewise, has a considerable influence in determining decompositions where the application of heat is necessary; and according to Berthollet, the decomposition of a compound body of which one of the ingredients has a great tendency to assume the elastic form is to be ascribed to the disposition it has to escape from its combination, when aided by the intervention of even a weaker affinity.

In complex affinities the same cause determines the union of substances disposed to assume the elastic form, and separates them as a volatile compound. "If, therefore," says he, "it be desired to know the result of the exposure of two salts to the action of heat, it is only necessary to consider which of the two bases and which of the two acids have the greater volatility, if there be a difference; for the more volatile base and acid will escape and enter into combination, and the fixed base and fixed acid will remain behind, and combine with one another."[1] Tables representing the forces of affinity have been constructed; but, as Dr. Henry has justly remarked, "one great obstacle to the construction of such tables is the difficulty of ascertaining with precision the quantities of bodies required for neutralization."[2]

A knowledge of the doctrines of affinity is of the utmost importance in pharmacy; and, as the foregoing sketch presents little more than an outline, I must refer those who would wish to investigate the subject to Thomson's and Murray's *Systems of Chymistry*, Bergmann's *Dissertation on Elective Attraction*, Berthollet's *Researches into the Laws of Chymical Affinity*, Richter's *Foundation of Stochiometry*, Sir Humphry Davy's *Elements of Chymical Philosophy*, and my friend Dr. Turner's *Elements of Chymistry*.

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[1] *Researches*, p. 3. quoted by Murray, *System of Chymistry*, i. 120.
[2] *Henry's Elements of Experimental Chymistry*, 7th ed. vol. i. p. 57.

II. REPULSION.

REPULSION is that force which separates the particles of bodies from one another, and consequently counteracts or modifies the attractions by which they are combined and preserved together in masses. It is supposed to depend on the operation of one or more of the three following powers: *Caloric, Light, Electricity.*

a. CALORIC.

The cause of the sensation of heat is denominated *Caloric.* Philosophers are not completely agreed whether it is a property only of bodies, such as a vibration of their particles[1], or a peculiar substance; the latter opinion is the one more generally adopted.

Under this opinion, caloric is regarded as a very subtile, elastic fluid, which penetrates more or less all bodies, passes readily from one to another, yet cannot be wholly separated from any one: and is every where diffused. Its particles are supposed mutually to repel each other; and bodies into which it enters in any sensible quantity are increased in *bulk,* and undergo other changes of form, while their *density* is diminished. It is radiated in the same manner as light, and in this state forms a part of the solar ray.[2] The rays are refrangible, and capable of reflexion, and of polarization, like those of light. It has no ascertainable gravity; and neither the addition nor the abstraction of it alters, sensibly, the weight of bodies.[3] It exists in two different states: in a *free* state, and, in a *latent* state, or one of intimate union.

Regarding it as matter, the sources whence it may be obtained, the laws which regulate its motion and distribution, and its effects, require to be noticed.

Sources of Caloric.

The known sources of caloric are, the *sun, combustion, mechanical action, chymical action, electricity,* and *the principle of vitality in animals.*

a. The *sun* is an apparent source of caloric; but the direct action of the sun's rays upon bodies seldom produces a temperature exceeding 160°. When these, however, are concentrated by means of a concave mirror, or a lens; or when means are taken to prevent the communicated heat from being carried off by the surrounding bodies, a much higher

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[1] The idea of caloric being motion or vibration originated with Lord Bacon.
[2] *Philosoph. Trans.* 1807. [3] *Ibid.* 1799, p.179.

The known sources of caloric are the sun, comb temperature can be produced. This source of caloric is not resorted to for pharmaceutical purposes.

b. Combustion is a source of caloric highly interesting on account of its utility.

When a combustible is heated to a certain degree, it becomes still hotter of itself, and is consumed, emitting rapidly light and caloric, until the whole substance has suffered a change of properties.

The nature of this process was first attempted to be explained by Lavoisier, who laid it down as a chymical axiom, that "in every case of combustion oxygen combines with the combustible body." His explanation of combustion depends on two laws: 1st, That when a combustible body is heated to a certain temperature, it immediately begins to attract and combine with the oxygen of the atmospheric air. 2dly, This oxygen being in a state of gas, and combined with light and caloric, is decomposed during its union with the combustible, and its caloric and light are set free in a sensible form, while the oxygen itself combines with the combustible and forms a new compound. The truth of this theory was generally supposed to be proved by the following facts:— 1. that combustion does not go on unless oxygen be present; and it is more brilliant in oxygen gas than in common air; 2. that the products of combustion are always heavier than the body consumed; and, 3. this increase of weight is exactly equal to the quantity of oxygen which the air loses. One objection to this theory, namely, that every combination of oxygen with bodies does not produce the phenomena of combustion, was endeavoured to be explained by Brugnatelli, who supposed that oxygen combines with bodies in two states:—"1. Retaining the greater part of the caloric and light with which it is combined when in the state of gas; and, . After having let go all the caloric and light with which it was combined."

The above theory of combustion is, however, liable to objections: 1. It is a well known fact that heat is evolved in chymical action, when the products contain more insensible caloric than the substances that combine to form them: 2. The emission of caloric and light is not proportional to the quantity of oxygen that combines with the combustible, and the quantity of light that appears, depends, altogether, upon the combustible. Besides, the phenomena of combustion display themselves when no oxygen is present: thus phosphorus, and some metals in a state of minute division, undergo combustion in chlorine gas. Potassium also burns, emitting heat and light, in cyanogen gas. Berzelius regards the heat of combination as an electrical phenomenon, arising from opposite electrical substances neutralizing one another.

The caloric set free by the burning or combustion of coal, coke, coal gas, charcoal, oil, oil gas[1], wax, tallow, and alcohol, is applied to the purposes of life, and is of the first importance in the practice of pharmacy: thence, endeavours have been made to ascertain the quantity of caloric evolved during the burning of different combustibles, and several experiments have been instituted, by the most able chymists, at different times, for this purpose. The following table exhibits the quantity of caloric evolved by the combustion of different substances, when all the circumstances are equal, the estimate being formed from the quantity of ice melted during the burning of one pound of each of the substances.[2]

Substances burnt, 1 lb.	Oxygen consumed in lbs.	Ice melted in lbs.			
		Lavoisier.	Crawford.	Dalton.	Rumford.
Hydrogen - -	6˙	295˙6	480	320	
Carburetted hydrogen - -	4˙	—	—	85	
Olefiant gas -	3˙5	—	—	88	
Carbonic oxide -	0˙58	—	—	25	
Olive oil - -	3˙5	148	89	104	93˙073
Rape oil - -	—	—	—	—	124˙097
Wax - -	3˙5	133	97	104	126˙242
Tallow - -	3˙5	—	—	104	111˙582
Oil of turpentine	—	—	—	60	
Alcohol - -	—	—	—	58	67˙470
Sulphuric ether -	3˙	—	—	62	107˙027
Naphtha - -	—	—	—	—	97˙834
Phosphorus -	1˙5	100	—	60	
Charcoal - -	2˙8	96˙5	69	40	
Sulphur - -	1˙36	—	—	20	
Camphor - -	—	—	—	70	
Caoutchouc - -	—	—	—	42	

[1] Dr. Dalton states that the combustible gases give out caloric in proportion to the oxygen which they consume.

[2] *Thomson's Chymistry*, 4th edit. ii. 610.

The combustion of hydrogen in oxygen gas forms the most intense heat that can be produced.

c. Mechanical action consists of percussion and friction.

1. *Percussion*, as far as it applies to solid bodies, is another source of caloric. Smiths, for instance, are in the habit of kindling their fires by means of an iron rod smartly and quickly hammered until it become red-hot. This effect appears to arise from condensation, or forcing the integrant particles of the bodies closer together, so as to dislodge the latent caloric they contain, and give it out in the form of sensible caloric. The specific gravity of iron is increased ·052 by being hammered; and it becomes so hard and brittle that it cannot again be heated by percussion until it has been exposed for some time to a red heat in the forge.

2. *Friction* is also a source of caloric. It is a well-known fact, that a considerable quantity of free caloric is disengaged when two substances are smartly rubbed together; but the real source of the caloric thus evolved still remains undetermined.

d. Electricity. The passage of this fluid through the air in discharging Leyden phials and batteries produces combustion.

e. Chymical action. The chymical union of two substances, in many cases, evolves caloric. This always takes place when the density or specific gravity of the mixture is greater than the mean of the substances mixed; as in the mixture of alcohol and water, or of sulphuric acid and water: and much caloric is also evolved when water is thrown upon quicklime, owing to the solidification of the water when it unites with the lime. The caloric which is evolved in these and other instances of mixture is the latent caloric, which is the cause of the fluidity of the components; for, as the compound is less fluid, and consequently requires the presence of a smaller quantity of combined caloric, the superabundance which the more fluid components contained must be necessarily set free.

f. The vital principle in animal bodies. This is an obvious source of caloric; but it is never employed for pharmaceutical purposes.

Such are the sources from which caloric is obtained. Combustion is the most important of these; and the knowledge of the laws by which it is regulated, and of the modes of conducting it, is of the first consequence in the practice of pharmacy. (See *Furnaces.*)

Distribution and Effects of free Caloric.

From whatever source caloric is obtained, it passes from bodies in which it is accumulated in a free state into bodies which contain less of it, until both are brought to an equilibrium. "The state of a body with regard to its power of producing the different effects arising from the presence of caloric, is termed its *temperature*;" and this depends on the quantity of sensible caloric contained in it. Thus, when a vessel containing water is placed on the fire, a quantity of caloric passing from the fire into the water, the temperature of the water is raised, or it is made sensibly hotter; and if the water, thus heated, be taken from the fire and placed in a cold place, the sensible caloric accumulated in it passes from it into the air and surrounding bodies, until it become as cold as they are, or until its temperature be lowered to an equilibrium with theirs. The caloric lost by hot bodies during their cooling is carried off: 1st, by the conducting power of the surrounding medium, which "diminishes as the temperature of the hot body approaches to that of the medium;" 2dly, by radiation; 3dly, by currents, or the repeated changes of the portion of medium immediately in contact with the hot body, produced by the change of density, occasioned by the caloric they receive from the hot body, enabling them to rise and give place to a new portion, which, being heated, is also displaced in its turn, and so on till the temperature of the hot body approaches to that of the medium. By accelerating these changes, the rate of cooling is proportionably quickened; and thence the cooling effect of winds and artificial currents of air.

The temperature of bodies can be comparatively ascertained, to a certain extent, by the sensations they induce. Thus, a body containing much sensible caloric feels warm or hot to the touch, owing to its caloric flowing into the hand; and one containing less than the human body gives the sensation of cold, owing to the abstraction of caloric from the hand. But this mode of judging of temperature is very limited, and depends on the state of the sentient organ, the conducting power of the body which is touched, and many other external circumstances, which prevent confidence from being placed on it as a comparative measure of temperature; and, therefore, instruments have been invented to measure the degrees of temperature of different bodies, the properties of which depend on the *expansion* or increase of bulk which bodies suffer when caloric enters into them.

The thermometer is a most useful and important instrument of this kind. It is a hollow glass tube, having at one end a hollow globe or bulb, the bore of the tube being perfectly cylindrical and small, and the bulb of a proportional size. The bulb, and a portion of the tube, after the air is expelled by holding the bulb over the flame of a lamp, are filled with mercury or coloured alcohol, by immersing the open end of the tube in either of these fluids: as the air which still remains in the tube cools, the mercury is forced up into the tube, and supplies the place of the air which heating it had expelled. The remaining air is expelled by boiling the mercury, and the tube is then hermetically sealed at the extremity. When the bulb of this instrument is applied to a hot body, the mercury, or the fluid it contains, rises in the tube, and continues to do so until the thermometer acquires the same degree of temperature as the hot body, when the mercury becomes stationary, and the point to which it rises indicates the relative temperature of the hot body. In the same manner, when the bulb is applied to a cold body, the mercury contracts and falls in the tube, owing to the abstraction of caloric by the cold body. The height to which this rises or falls, indicating the proportion of increase or the diminution of temperature, is ascertained by a scale, which divides the tube into a number of equal parts or degrees.[1] As the instrument may be occasionally plunged into corrosive fluids, part of the stem (*a*) and the bulb (*b*) should project beyond the scale; or the scale may turn up with a hinge. A thermometer has been made by the late Mr. Jowitt, one of my pupils, which encloses the scale in a glass-case affixed to the thermometer in every part, except the bulb, which permits it to be used in the most active media.

For ordinary purposes, mercury is the fluid best adapted for thermometers, its expansion being most equable; but alcohol is used when great degrees of cold are to be measured.

The thermometer commonly employed in this country is that of Fahrenheit[2]; but as three other thermometers are used on the Continent, it may be proper to notice all of them, and point out the circumstances in which their scales differ.

Fahrenheit, in forming his thermometer, ascertained two

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[1] Thermometers of great accuracy may be purchased. Persons who may wish to construct them for themselves will find ample instructions for their guidance in the third chapter of *Henry's Elements of Experimental Chymistry*.

[2] Fahrenheit was an artist of Amsterdam.

fixed points; that of freezing water, and that of boiling water: the space between these points he divided into 180 equal parts or degrees, and carried the scale downwards 32 degrees, and there fixed his zero. The part of the scale indicated by the freezing of water he made to be 32 degrees from its beginning: therefore 32° is marked as the freezing point: and the space between it and the boiling point, which is 212°, is equal to 180°. The scale may be extended above this point, and also below the commencement of the scale, the descending degrees being marked inversely with the same numbers as the ascending.

The scale of the thermometer of *Celsius*, which has been used in France since the Revolution, begins at the freezing point of water, which is consequently marked 0, and the space between that and the boiling point is divided into 100 equal degrees; hence it has been named the *Centigrade Thermometer.* Each degree of the scale is $\frac{4}{9}$ths more than a degree of Fahrenheit's, or one of the latter is equal to $\frac{5}{9}$ths of a degree of the centigrade scale. To find, therefore, the degrees of Fahrenheit's scale, corresponding to those of the centigrade, the given number of the latter must be multiplied by 9, and divided by 5, adding 32 to the quotient.[1] The sum expresses the degree on the scale of Fahrenheit.

Reaumur's thermometer, which is still used in Italy and Spain, also commences at the freezing point, which is marked 0; and between this and the boiling point, it is divided into 80 degrees. Each degree is, therefore, $\frac{4}{9}$ths more than one of Fahrenheit's; and to reduce the scale of Reaumur to that of Fahrenheit, the given number of degrees of the former must be multiplied by 9, and divided by 4, adding 32 to the quotient.

In *De Lisle's* thermometer, which is used only in Russia, the space between the boiling and freezing points is divided into 150°, the gradation beginning at the boiling point, which is marked 0; and increasing inversely to the freezing point, which is marked 150°. It is seldom mentioned by authors.

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[1] To reduce 212° Fahrenheit to centigrade, by common arithmetic—

212° Fahr.
32
———
180
5
———
9) 900 (100° centigrade.

TABLE showing the degrees of Reaumur's and Fahrenheit's thermometers corresponding with those of the Centigrade thermometer.

Cent.	Reau.	Fahr.	Cent.	Reau.	Fahr.	Cent.	Reau.	Fahr.
100	80·	212·	58	46·4	136·4	16	12·8	60·8
99	79·2	210·2	57	45·6	134·6	15	12·	59·
98	78·4	208·4	56	44·8	132·8	14	11·2	57·2
97	77·6	206·6	55	44·	131·	13	10·4	55·4
96	76·8	204·8	54	43·2	129·2	12	9·6	53·6
95	76·	203·	53	42·4	127·4	11	8·8	51·8
94	75·2	201·2	52	41·6	125·6	10	8·	50·
93	74·4	199·4	51	40·8	123·8	9	7·2	48·2
92	73·6	197·6	50	40·	122·	8	6·4	46·4
91	72·8	195·8	49	39·2	120·2	7	5·6	44·6
90	72·	194·	48	38·4	118·4	6	4·8	42·8
89	71·2	192·2	47	37·6	116·6	5	4·	41·
88	70·4	190·4	46	36·8	114·8	4	3·2	39·2
87	69·6	188·6	45	36·	113·	3	2·4	37·4
86	68·8	186·8	44	35·2	111·2	2	1·6	35·6
85	68·	185·	43	34·4	109·4	1	0·8	33·8
84	67·2	183·2	42	33·6	107·6	0	0·	32·
83	66·4	181·4	41	32·8	105·8	1	0·8	30·2
82	65·6	179·6	40	32·	104·	2	1·6	28·4
81	64·8	177·8	39	31·2	102·2	3	2·4	26·6
80	64·	176·	38	30·4	100·4	4	3·2	24·8
79	63·2	174·2	37	29·6	98·6	5	4·	23·
78	62·4	172·4	36	28·8	96·8	6	4·8	21·2
77	61·6	170·6	35	28·	95·	7	5·6	19·4
76	60·8	168·8	34	27·2	93·2	8	6·4	17·6
75	60·	167·	33	26·4	91·4	9	7·2	15·8
74	59·2	165·2	32	25·6	89·6	10	8·	14·
73	58·4	163·4	31	24·8	87·8	11	8·8	12·2
72	57·6	161·6	30	24·	86·	12	9·6	10·4
71	56·8	159·8	29	23·2	84·2	13	10·4	8·6
70	56·	158·	28	22·4	82·4	14	11·2	6·8
69	55·2	156·2	27	21·6	80·6	15	12·	5·
68	54·4	154·4	26	20·8	78·8	16	12·8	3·2
67	53·6	152·6	25	20·	77·	17	13·6	1·4
66	52·8	150·8	24	19·2	75·2	18	14·4	0·4
65	52·	149·	23	18·4	73·4	19	15·2	2·2
64	51·2	147·2	22	17·6	71·6	20	16·	4·
63	50·4	145·4	21	16·8	69·8	21	16·8	5·8
62	49·6	143·6	20	16·	68·	22	17·6	7·6
61	48·8	141·8	19	15·2	66·2	23	18·4	9·4
60	48·	140·	18	14·4	64·4	24	19·2	11·2
59	47·2	138·2	17	13·6	62·6	25	20·	13·

These instruments are well adapted for determining the variations of temperature which bodies undergo: but a certain degree of fallacy attends the observations made with them, chiefly owing to the expansion of mercury increasing with the temperature. Thus, the medium degree of heat between the freezing and boiling points, although marked on the scale 122°, yet is actually 118·8° 1′ only; the temperature which is equal to raise the mercury in the tube 86°

in the first instance, being sufficient, by increased expansion, to raise it 94° in the second.

TABLE exhibiting the degrees of the Centigrade and Fahrenheit's thermometers corresponding to those of Reaumur's thermometer.

Reau.	Cent.	Fahr.	Reau.	Cent.	Fahr.	Reau.	Cent.	Fahr.
80	100·	212·	46	57·5	135·5	12	15·	59·
79	98·75	209·75	45	56·25	133·25	11	13·75	56·75
78	97·5	207·5	44	55·	131·	10	12·5	54·5
77	96·25	205·25	43	53·75	128·75	9	11·25	52·25
76	95·	203·	42	52·5	126·5	8	10·	50·
75	93·75	200·75	41	51·25	124·25	7	8·75	47·75
74	92·5	198·5	40	50·	122·	6	7·5	45·5
73	91·25	196·25	39	48·75	119·75	5	6·25	43·25
72	90·	194·	38	47·5	117·5	4	5·	41·
71	88·75	191·75	37	46·25	115·25	3	3·75	38·75
70	87·5	189·5	36	45·	113·	2	2·5	36·5
69	86·25	187·25	35	43·75	110·75	1	1·25	34·25
68	85·	185·	34	42·5	108·5	0	0·	32·
67	83·75	182·75	33	41·25	106·25	1	1·25	29·75
66	82·5	180·5	32	40·	104·	2	2·5	27·5
65	81·25	178·25	31	38·75	101·75	3	3·75	25·25
64	80·	176·	30	37·5	99·5	4	5·	23·
63	78·75	173·75	29	36·25	97·25	5	6·25	20·75
62	77·5	171·5	28	35·	95·	6	7·5	18·5
61	76·25	169·25	27	33·75	92·75	7	8·75	16·25
60	75·	167·	26	32·5	90·5	8	10·	14·
59	73·75	164·75	25	31·25	88·25	9	11·25	11·75
58	72·5	162·5	24	30·	86·	10	12·5	9·5
57	71·25	160·25	23	28·75	83·75	11	13·75	7·25
56	70·	158·	22	27·5	81·5	12	15·	5·
55	68·75	155·75	21	26·25	79·25	13	16·25	2·75
54	67·5	153·5	20	25·	77·	14	17·5	0·5
53	66·25	151·25	19	23·75	74·75	15	18·75	1·75
52	65·	149·	18	22·5	72·5	16	20·	4·
51	63·75	146·75	17	21·25	70·25	17	21·25	6·25
50	62·5	144·5	16	20·	68·	18	22·5	8·5
49	61·25	142·25	15	18·75	65·75	19	23·75	10·75
48	60·	140·	14	17·5	63·5	20	25·	13·
47	58·75	137·75	13	16·25	61·25			

Thermometers are instruments for measuring moderate degrees of heat; for those beyond a certain point, or intense degrees, the *Pyrometer* is employed. This instrument consists of a metallic bar of little fusibility and uniform expansion. Professor Daniell has ascertained, that both platinum and wrought iron answer. The expansion of the bar indicates the degree of heat.[1]

[1] Another pyrometer is that invented by Mr. Wedgwood. It depends on the degrees of contraction which pure argil suffers when exposed to high temperatures; and for this purpose small cylinders of pure clay are made in a mould, flattened on

Expansion, or increase of bulk, is the most general effect of caloric, and, with very few exceptions, may be regarded as the general law of its operation. When caloric flows into a body, it separates its integrant particles from one another, and hence augments its volume. This change is smallest in solids, more considerable in liquids, and most in gaseous bodies; or the expansibility is in the reverse ratio of the force of aggregation. Thus the expansion of air is 8 times greater than that of water; and the expansion of this 45 times greater than that of iron.

The expansion of solid bodies is, in general, so very inconsiderable as not to be easily ascertained by measurement; but, as far as it can be known, it is nearly equable. The degree of expansion, however, is not the same in all solids: thus, for example, the metals expand in the following order, commencing with the least expansible: platina, antimony, iron, bismuth, copper, tin, lead, zinc. Argil is an exception to the law of expansion in solids; for the bulk of pure clay diminishes, when heated, in the ratio of the intensity of the heat to which it is exposed. The cause of this anomaly has not been discovered. The expansion of liquids is more evident than that of solids, but not uniform—the differences apparently depending on the greater or less volatility of the liquids; those expanding the most, the boiling point of which is lowest, and which, consequently, most readily assume the gaseous form. The degree of their expansion, also, increases with the augmentation of the temperature; or, the nearer a liquid approaches to the boiling point, the greater is the expansion produced by each degree of caloric; and the further it is from this point, the more equable is the expansion. Liquids, in the same manner as solids, suffer a difference of expansion from a given change of temperature. The following table, by Dr. Dalton, shows the expansion of the more common liquids, from 32° to 212° Fah., the volume at 32° being denoted by 1.

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one side, and fitted exactly to the wider end of a gauge, consisting of two straight pieces of brass, 24 inches long, fixed on a brass plate so as to converge, and divided into inches and tenths. The length to which the pyrometrical pieces can be slid in the converging groove, indicates the heat to which they have been previously exposed; and, as they do not expand again when cold, no fallacy can result from the action of heat on the gauge. Each degree of this scale is equal to 130° of Fahrenheit; and the 0, or commencement of it, corresponds with 1077½° of Fahrenheit's scale. The highest temperature that has been measured by it is 160°, or 21,877° of Fahrenheit, which is 30° above the point at which cast iron melts. But, as much higher temperatures than this must exist, so, also, there are temperatures much lower than can be measured by any thermometer.

Mercury.	Water.	Water saturated with salt.	Sulphuric acid, sp. gr. 1·185.	Muriatic acid, sp. gr. 1·137.	Oil of turpentine.	Ether.	Fixed oils.	Alcohol.	Nitric Acid, sp. gr. 1·40.
·0200 =	·0466 = $\frac{1}{21\cdot5}$	·0500 = $\frac{1}{20}$	·0600 = $\frac{1}{17}$	·0608 = $\frac{1}{17}$	·0700 = $\frac{1}{14}$	·0700 = $\frac{1}{14}$	·0800 = $\frac{1}{12\cdot5}$	·0110 = $\frac{1}{9}$	·0110 = $\frac{1}{9}$

To the general law of the expansion of liquids by heat, water furnishes an exception. Thus, from the lowest temperature at which water can remain liquid, to 40°, or 39°·39 Fahrenheit[1], heat diminishes the bulk of water, instead of expanding it; but above 40° to 212°, expands it.

All gaseous bodies suffer the same expansion by the same additions of caloric, supposing the circumstances to be equal. Their expansion is almost perfectly equable, or the same augmentation takes place by the same addition of caloric at every degree of temperature between the freezing and the boiling point of Fahrenheit's thermometer. By the experiments of Gay Lussac, 100 parts of atmospheric air, heated from 32° to 212°, expand 137·5 parts, or $\frac{1}{480}$th for every degree of the thermometer; and the other gases, the steam of water, and the vapour of ether, undergo the same expansions by the same augmentations of temperature. The cause of the equable expansion of gaseous bodies appears to be the absence of cohesion; so that, at a low temperature, there is no more resistance made to the expansive power of the caloric thrown into the gas, than at a high temperature.

But, besides the change in bulk produced by the introduction of caloric into substances in different quantities, they are changed in state, assuming the *fluid form* and that of *vapour;* or, they are *ignited.*

Fluidity is an effect of caloric, arising from the repulsive force of the caloric, which enters into any substance fitted to take on the fluid form, separating the particles from one another to such a distance as to render them easily moveable on one another in every direction. All solids, with a very few exceptions, are susceptible of the fluid form, when ex-

[1] *Hallstrom, Ann. de Chimie et Phys.* t. xxviii. p. 90.

posed to a sufficient degree of heat; and all liquids, with the exception of alcohol and ether, become solid when exposed to very low temperatures. The particular temperatures necessary for the production of these changes, however, are exceedingly various, but for the same bodies they are always the same.[1] In some cases, the change is sudden, or the body instantly passes from the solid to the liquid state; in other cases, it passes through several degrees of softness before it be perfectly liquefied: the conversion of ice into water is an example of the first; the melting of glass, of wax, and other unctuous matters, are instances of the second. There are some bodies, nevertheless, which cannot be melted or *fused*, owing to their suffering chemical decomposition at a lower temperature than is required for their *fusion* under the ordinary pressure of the atmosphere:—a piece of wood, for instance, cannot be melted by the application of any degree of heat.

Although the melting point, in most cases, is always the same in the same bodies, yet circumstances may vary it; and the admixture of other substances may alter it very considerably. Thus, the melting point of ice, or, what is the same thing, the freezing point of water, is 32°; but by exposing water slowly to the action of freezing mixtures, it may be cooled down to 22° before it freezes. The addition of salts renders this point still lower, as may be seen by the following table.[2]

Names of salts.	Proportion by weight dissolved in 100 parts of water.	Freezing point.
Common salt - -	25·	4·
Sal ammoniac - -	20·	8·
Rochelle salt - -	50·	21·
Sulphate of magnesia	41·6	25·5
Nitre - - -	12·5	26·
Sulphate of iron -	41·6	28·
——— zinc -	33·3	28·6

[1] Table showing the degree of temperature, according to Fahrenheit's thermometer, at which several solid bodies melt.

Lead	612°	Copper	4587°, *Fahr.*	28, *Wedg.*	Spermaceti	112°
Bismuth	476	Silver	4717	28	Phosphorus	100
Tin	442	Iron	21637	157	Tallow	92
Zinc	703	Sulphur	218		Oil of anise	50
Antimony	809	Bees' wax	142		Camphor	303
Mercury	—39	Lard	97		Ice	32

[2] *Phil. Trans.* 1788, 27., quoted by Dr. Thomson, *Syst. Chymistry*, 4th edit. i. 520.

When solids pass to the liquid state they receive an additional quantity of caloric, which combines with them, but does not sensibly elevate their temperature; and this *caloric of fluidity* or *latent heat*, as it has been named, is again given out in a sensible form, when the body returns to a solid state. If water, for example, be exposed to a great degree of cold, and kept free from agitation, it may be cooled several degrees below the freezing point, namely, to 21°, and yet remain fluid; but if it be then agitated, it instantly congeals, and at the moment of its congelation its temperature rises to 32°. All fluids, therefore, are combinations of solids and certain doses of caloric. Thus, if snow at 32° be mixed with an equal weight of water at 172°, the snow instantly melts, but the temperature of the mixture is only 32°; so that 140° of caloric have disappeared, or rather have entered the ice, and as the caloric is no longer sensible to the thermometer, it is justly said to have become latent: thence the quantity of caloric necessary to give fluidity to ice is 140°. These facts were first ascertained by Dr. Black, in 1762; and fluidity in general has been proved to depend on a similar cause. Softness, plasticity, malleability, and ductility, probably depend also upon the repulsive force of the latent heat which combines with bodies.

Vapour, which is another effect of caloric, is that state into which all fluids and some solids pass when their temperature is raised to a certain point, or caloric is thrown into them in sufficient quantity to separate their integrant particles to distances beyond the sphere of the attraction of cohesion. The fluid passes to the state of vapour, becoming invisible and elastic, and possessing the other mechanical properties of air.

Evaporation, however, is also spontaneously produced, partly by the agency of caloric alone, partly by the solvent power of atmospheric air, forming a solution of the body in the aërial fluid. By *spontaneous evaporation*, the fluid is gradually converted into the aëriform state at every temperature. Water, alcohol, ether, and volatile oils, are susceptible of spontaneous evaporation, so that a portion of any of them exposed to the air, in a flat vessel, soon altogether disappears: "but sulphuric acid and the fixed oils never assume the form of vapour till they are raised to a certain temperature."

All fluids have a fixed point of temperature at which their *vaporization*, or conversion into vapour, commences, which is denominated their *boiling point;* and beyond this point fluids cannot be heated, if freely exposed to the air so as to allow the vapour to escape as it forms. Thus water at 212° boils, and is progressively converted into steam at the bottom of the vessel, which, rising in bubbles through the water, produces the ebullition that characterises boiling; but although the fire be raised ever so much, yet the temperature of the water never exceeds 212°, the vapour carrying off every additional increment of heat in a latent form. The *boiling point*, as this degree of temperature is termed, varies in different bodies; and in the same body also, if it be placed under different circumstances, particularly with regard to pressure. Thus, at 29·92 of the barometer, the boiling point of ether is 96°; of alcohol, 176°; of pure water, 212°; of water saturated with common salt, 225°; of oil of turpentine, 316°; of mercury, 662°; and so on. In a vacuum all liquids boil at a temperature 140° lower than in the open air[1]; and in Papin's digester, in which water can be heated under a great pressure, the temperature may be raised to 300° without ebullition. Owing to this circumstance, highly volatile substances, as ammonia and ether, cannot easily be manufactured in elevated situations.

The elasticity of the vapour of liquids boiled in the open air is equal to that of the circumambient atmosphere; but, under such a pressure that the temperature of the vapour may be much augmented, the elasticity increases with the temperature. At low temperatures, on the contrary, vapours lose their elasticity, are condensed, and return to their fluid state. The conversion, therefore, of liquids into elastic fluids depends on the same cause as the conversion of solids into fluids; namely, "the combination of a certain dose of caloric with the liquid, without any increase of temperature."[2] The vapour carries off all the caloric which enters a fluid after it arrives at its boiling point, and retains it in a latent form; for the vapour is not sensibly hotter than the boiling liquid: thus, steam, the temperature of which is indicated by the thermometer to be 212°, is water combined with 967° of caloric, which remain latent as long as the temperature of the steam is maintained at 212°, but is again given out when a lower temperature changes that vapour to the state of a liquid. The vapour of alcohol contains 442° of latent heat, that of ether 302·379, of oil of turpentine 177·87, of nitric acid 531·99, and of vinegar, 875.[3] Bodies which resist the

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[1] *Professor Robison, Black's Lectures*, p. 151.

[2] The important discovery of the causes which produce the changes of bodies from the solid to the liquid and aëriform state was made by Dr. Black, in 1760.

[3] *Ure, Phil. Trans.* 1818.

greatest known heat without vaporization are said to be fixed in the fire.

Gases resemble vapours in their constitution, but differ from them in the greater reduction of temperature which is required for their condensation, some of them not being reducible by ordinary pressure, or by any known reduced temperature, to the fluid or solid state. Are they compounds of solid or of liquid substances and caloric? Ammoniacal gas condenses into a fluid at 45°; and many of the other gases have been condensed into fluids by Dr. Faraday.

Ignition is another effect of caloric, but differing altogether from expansion, fluidity, and vaporization, which may in some measure be regarded as different degrees of one general effect. It implies an emission of light from bodies which are much heated, or combined with a large portion of caloric, without their suffering any change of composition. It is totally independent of the presence of air, and is a simple effect of caloric. Aëriform substances are not susceptible of ignition.

The degree of temperature at which all bodies capable of ignition begin to be ignited, or become red-hot, is nearly the same,—about the 1,000th degree of Fahrenheit in broad day, but between the 600th and 700th in the dark: by raising the temperature the illumination increases, until a perfectly white light is produced, which is the highest point of ignition. Ignition is supposed to arise from the extrication of the light, which is regarded as a constituent of the ignited body, by the repulsive agency of the additional caloric: but this explanation of the phenomenon is liable to some objections, and the real cause remains still undetermined.

As a pharmaceutical agent, *Caloric* is of the first importance. In the majority of cases it produces decomposition; but in some it favours combination. The decomposition most easily effected by it is the separation of the more volatile from the more fixed ingredients of compounds. Thus, in the process of distillation (see *Operations*), when weak spirits are heated, the alcohol separates from the water, owing to its superior volatility, and, by condensation in a different vessel, is obtained as a distinct substance. Almost all compounds into which oxygen has entered without having occasioned combustion, as nitric acid, and some metallic oxides, suffer likewise decomposition by caloric. All compound bodies containing combustibles are also decomposable by it; as are also compounds consisting of two or more combustible ingredients, in combination with oxygen, as almost all animal and vegetable matters. On the contrary, the compounds which are little or not at all affected by caloric, as far as regards their composition, are those which have been formed by combustion; such as water, phosphoric acid, and carbonic acid.[1] The proper application of caloric for the purpose of obtaining new combinations by lessening the force of aggregation, and thus favouring the attraction of affinity; or for producing decompositions by weakening or destroying altogether the force of these attractions so as to obtain the principles of bodies in a distinct state, constitutes the most important feature of operative pharmacy. (See *Operations.*)

2. LIGHT.

Light, according to the theory of Newton, is a substance consisting of very subtile particles, which are constantly emanating in straight lines from the sun, the fixed stars, and incandescent bodies. Some philosophers, however, following Hooke and Huygens, believe that light is merely the state of undulation of a highly rare, elastic medium, which, it is supposed, fills the whole of the universe. Both theories have their supporters; but the question may be regarded as being still undetermined. The size of the particles of light is too minute to be appreciated; but their velocity is estimated to be at the rate of 195,000 miles in a second. They appear to repel each other, like the particles of caloric.

Light, if not intercepted, is diffused in straight lines, in every direction, from every luminous point. The rays of light are reflected by aqueous vapour, clouds, liquids, and solid in various degrees: much depending on the condition of the surfaces of the reflecting bodies.

A ray of light falling obliquely upon a clean polished surface is *reflected* from it at an angle equal to the angle of its incidence. But when a ray of light falls at an angle of 35° 25′ on a polished plate of glass; and, in being reflected from it, falls upon another plate of glass, so placed that its angle of incidence is also 35° 25′, the second plate may be turned round its axis without varying the angle which it makes with the ray that falls upon it. If the two planes of reflection be parallel to each other, the ray of light is reflected in the same manner from both plates of glass; but if the second plate be turned round a quadrant of a circle, so as to make the plane of reflection perpendicular, the whole ray will pass through it, and none of it be reflected, yet, if this plate be turned round another quadrant of a circle, so as to make the reflecting planes again parallel, the ray will be now reflected by it as at first. The light can penetrate through the glass only when the reflecting planes are perpendicular, but is reflected when they are parallel. This property of

[1] *Thomson's Chymistry*, 4th edit. i. 546.

light has been termed by Malus, by whom it was first discovered, its *polarization.*

When the ray of light, moving in a straight line, passes within a certain distance of a body parallel to its direction, it bends towards the body, or is *inflected;* but when the body parallel to its course is at a greater distance, the ray is bent from it, or *deflected.* When it passes obliquely from one medium to another of a different density, it is bent a little from the line of its former direction, and assumes a new one, or is *refracted.* In passing into a denser medium it is refracted towards the perpendicular; but is refracted from the perpendicular when passing into a rarer medium. The refraction is proportional to the density of the medium; but, in that of a combustible, the refraction is greater than the ratio of its density; and when a liquid is converted into vapour, its refractive power diminishes at a greater ratio than its density diminishes.[1]

Every ray of light is resolvable into seven other distinct rays, each possessing a different degree of refrangibility; and consequently divisible from each other by the prism. The ultimate or component rays are distinguishable by the impression of colours they excite on the eye; and are arranged in the following order: *red, orange, yellow, green, blue, indigo, violet.* The red is the least refrangible, reflexible, and inflexible; the violet the most. The order in which the others are placed is that of their respective refrangibility The colour of bodies depends on their transmitting or reflecting those rays only which excite the impressions of their colour. The reflection of the whole prismatic rays constitutes white; the absorption or suffocation of all, or the greater part, of these, occasions black, which is the total absence of light.

The *illuminating power* of the rays of light differs. Those towards the middle of the prismatic spectrum, as above arranged, possess the greatest illuminating power: the maximum lies in the yellow; this diminishes as the rays approach towards the extremities.

The *calorific power* of the rays of light differs. Of the visible rays, the red is the hottest: but the really hottest ray is beyond the point of the red ray of the prismatic spectrum. Such is the opinion of Herschel, Sir H. Davy, and some others; but Professor Leslie contended that the red ray is the hottest. It is a curious fact that the heating power of the prismatic rays varies according to the kind of prism used to separate them: but the result of the experiments made by all

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[1] See the experiments of Arago and Petit, in the *Ann. de Chim. et Phys.* tom. i. 1.

authorizes the conclusion that the hottest ray is the invisible one beyond the red, the next in degree the red, and the next the yellow.

Light enters into combination with bodies; and, in some cases, is again extricated without any change being produced; as in pyrophori, or substances which absorb light, and emit it again when carried into a dark place. In some cases, however, the absorption of light by bodies occasions very sensible changes in them; the colour of plants, for example, their taste and odour, and the quantity of combustible matter they contain, depend on light; for a plant reared in the dark is nearly colourless, insipid, inodorous, and contains a very small proportion of combustible matter.

The natural sources of light are the sun and fixed stars; but it is also artificially produced by combustion, chymical combination, heat, and percussion. The sun's rays, the greatest source of light, have been found to be composed of three different species of rays: 1. rays which produce light and colour; 2. rays of mere heat; and, 3. rays which produce neither light nor colour, nor affect the thermometer, but which have the power of deoxidizing. Thus constituted, they produce very important chymical effects.

Light partially deoxidizes metallic oxides and salts. Thus it blackens chloride of silver; and as this takes place when the salt is placed beyond the violet ray, or out of the prismatic spectrum, the effect is apparently to be attributed to the action of a species of rays that excite neither heat nor light. It also reduces the nitro-muriatic solution of gold, when it is placed in contact with charcoal, or any other vegetable, or any animal matter; and the red oxides of mercury and of lead become much paler when exposed to the sun. The rays that produce these effects are the least refrangible. Dr. Wollaston, however, has pointed out one exception to this effect of these rays, in guaiacum, which becomes green, or oxidized, in the least refrangible rays; and is again changed to yellow, or deoxidized, in the most refrangible.

Light has a powerful tendency to decompose nitric acid, which it renders red and fuming, even when it is contained in vessels accurately closed. Almost all the vegetable and animal colouring matters have their brilliancy and colour much impaired by long exposure to the sun's rays; and the colour and the properties of vegetable powders kept in clear glass bottles are also affected by them. Light even seems to have a strong influence on the process of crystallization; for, if light be only partially admitted to a crystallizing solution, the crystals will be larger and more numerous on the enlightened side; and often the whole mass will radiate towards this point. Chaptal[1] found that by using a solution of a metallic salt, and shading the greater part of the vessel, capillary crystals shoot up the uncovered side, and the extent of the exposed part is distinctly marked by the limit of the crystallization.

Such are some of the properties of light, the chymical effects of the operation of which seem to be perfectly independent of its heating power; and there is even reason to believe, that the greatest chymical changes are produced by the invisible rays; for Ritter[2] affirms that, by transmitting the coloured rays through different prisms, he has separated them from the invisible or chymical rays, and obtained a coloured spectrum devoid of any chymical power.

3. ELECTRICITY *and* GALVANISM.

The phenomena of electricity depend on a very subtile fluid which is a powerful chymical agent, capable of producing immediate decompositions and new combinations. Galvanism appears to be essentially the same as electricity, differing, however, in some degree in its effects and the mode of its production. Both are to be regarded as repulsive powers.

a. Electricity may be communicated to all substances: by some it is transmitted without any perceivable obstruction, but by others with much difficulty: thence bodies, in their relation to electricity, are distinguished into two classes, *conductors* and *non-conductors:* and as it can be accumulated in the latter by friction and other means, these are also denominated *electrics;* while the former are named *non-electrics*, to indicate their incapability of being excited.

Metals, plumbago, charcoal, and most liquids, are conductors: all other substances are non-conductors; although many of these, when made very hot, become conductors. Dry atmospherical air is a non-conductor, but when loaded with moisture it becomes a conductor. All electrics are non-conductors, when rubbed, as, for instance, a glass rod, or a stick of sealing wax, with a piece of woollen cloth, attract light substances; and, when a conductor is approached to them, exhibit an appearance of light, attended with a peculiar sound and smell. Some electrics can be excited by simple heating or cooling. It is necessary, however, for obtaining any considerable excitation, that the rubber have some communication with the earth; from which it appears, that the great source of electricity is in the earth; and that excitation consists in the

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[1] *Journal de Physique*, xxxiii. 297.

[2] *Nicholson's Journ.* viii. 216.

mere transferring of the electrical fluid from one substance to another. By rubbing electrics on one another, the distribution of the electric fluid they contain is altered; and, on separating them, more than the natural quantity remains with the one, and less with the other. The one is then said to be electrified *plus*, and the other *minus*, or *positively* and *negatively*. When two bodies are both electrified positively, or both negatively, they repel one another; but if one of them be electrified positively, and the other negatively, they attract one another. Instead of this distribution of the same fluid, the existence of two fluids has been assumed, each of which repels its own particles, but attracts those of the other: and this assumption is more favourable for the explanation of the chymical agency of this fluid.

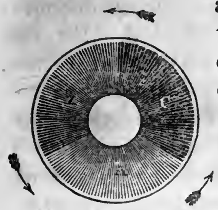
The chymical effects of electricity seem to depend, chiefly, on its power of producing a sudden high temperature; and this appears to be proportioned to the resistance opposed to its transmission. It often favours chymical combinations; as, for instance, that of oxygen with the metals, and promotes the instantaneous chymical union of gaseous bodies. It also effects chymical decompositions; as, for example, those of water, ammonia, alcohol, and metallic oxides. But for none of these purposes is it employed as a pharmaceutical agent.

b. Galvanism may be regarded as a modification of electricity, in which the fluid is evolved during certain chymical actions. It is transmitted through those substances which are conductors of common electricity, and with the same degrees of facility and rapidity. The metals, charcoal to a certain extent, plumbago, water, the mineral acids, and saline solutions, are perfect conductors; alcohol, ether, sulphur, oils, resins, and metallic oxides, are imperfect conductors; but glass, dried and baked woods, the dry animal cuticle, and dry gases, are non-conductors of the galvanic fluid.

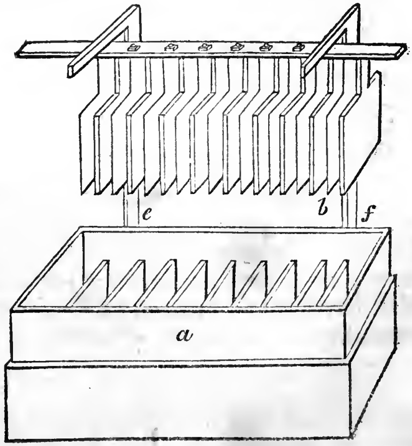
Galvanism is generally excited by arranging two different metals, as, for instance, copper and zinc, and a fluid, as sulphuric acid diluted with twenty or thirty parts of water, in such a manner that the metals touch each other in one part, and have the fluid interposed between them in another.[1] Now in this case, as in all others where chymical action occurs between a solid and a fluid, the electrical equilibrium is disturbed, and the latent electricity of the bodies is changed

1 The pile of Volta, which is not now employed, consists of plates of zinc and silver, and pieces of moistened woollen cloth, piled in the order of zinc, silver, cloth; zinc, silver, cloth, for twenty or more repetitions.

into active electricity. The surface of contact between the acid and the zinc is that at which the chymical action and the developement of electricity take place, whilst the copper acts the part merely of a conductor between the zinc and the fluid on the other side; and, in this manner, a galvanic circle is established. If we suppose Z, A, C, to represent zinc, acid,



and copper, and the surface of contact between Z and A to be that at which the electricity is developed, and C the conductor, the current will circulate in the direction of the arrows from A to C, and thence to Z. In the galvanic trough, the best instrument for developing this modification of electricity, the metals, soldered together in pairs, are placed transversely in the grooves of a well-seasoned wooden trough, or one of earthenware, and fixed in with a cement of resin and wax, to prevent any liquid from passing through; after which the diluted acid is poured between the pairs, so that it touches the zinc of one pair, and the copper of another, alternately; the copper side of every double plate looking towards one extremity of the trough throughout the arrangement, and the zinc side to the other extremity. This apparatus is named the Galvanic battery; and the distances between the pairs of soldered plates should be from one fourth to three fourths of an inch each, according to the width of the trough. The intensity of action of this apparatus, as far as the production of heat is concerned, seems to depend on the size of the plates, or extent of their surfaces, but, for producing chymical decomposition, on the number of plates. The more improved apparatus now used is a trough of earthenware, *a*, divided in its length by numerous partitions of the same material. Into each of the cells thus formed, and filled with the diluted acid, a plate of zinc and a plate of copper, *b*, *e*, are placed near one another, but not so as to touch, and a communication is made, by a metallic arc,



between the zinc in one cell and the copper in the next. The whole of these plates are attached to a wooden bar, so that they can be removed at the pleasure of the operator, and supported on hooks fixed in the cross bars of the props *e*, *f*, attached to the side of the trough.

As a chymical agent, Galvanism is the most powerful of all the repulsive forces, and is capable of producing decompositions which could not otherwise be effected. By its means, the chymical constitution of the alkalies and the earths has been established, and their bases discovered to be substances before unknown, which have been added to the list of metals.

By placing any body, water, for instance, composed of oxygen and an inflammable substance, in connection with the metallic wires proceeding from each end of a galvanic battery, the oxygen is attracted by the wire which is in the positive state, and repelled by that which is in the negative; while, at the same time, the inflammable is attracted by the negative wire, and repelled by the positive. Hence the components are separated, and obtained in a distinct state. In the decompositions thus effected, substances can be conveyed to a distance, and even through interposed ponderable matter, by the galvanic influence; a result which, however singular, is well ascertained.

Galvanism, like electricity, acts as a stimulus to the living system. Its effects on the animal body are, a sensation of light to the eye; a sensation of acidity on the tongue, and of pain in the muscles; and the excitement of strong muscular action.

It would be entering too much into hypothetical discussion to attempt an explanation of the phenomena of Galvanism. It has not yet been employed as a pharmaceutical agent, except for detecting the presence of bichloride of mercury, employed as a poison. (See PART III.)

On the forces of attraction and of repulsion every chymical, and consequently every pharmaceutical, effect more or less depends A knowledge, therefore, of the laws which regulate these powers is of the greatest importance, and forms the basis of all chymical science, and consequently of all pharmaceutical reasoning.

SECTION II.[1]

EVERY substance, whether it be regarded generally as forming a part of the mass of this globe, or particularly as an object of science, may be arranged in one or other of the three following classes: *Solids, Fluids,* and *Gaseous Bodies.* We shall now examine each of these classes separately, and endeavour to describe the constitutions and combinations of the substances composing them, which are objects of pharmacy.

I. SOLIDS.

SOLID bodies are masses of minute particles combined and held together by the attraction of aggregation or cohesion. The arrangement of the particles with regard to one another is often such as to produce regular figures, in which case the solids are said to be crystallized. Cohesion and crystallization have been already considered.

CONSTITUTION OF SOLIDS.

Arrangement of the principal Solids, as far as regards Pharmaceutical Substances.

I. SIMPLE *or* UNDECOMPOUNDED.

Carbon.	*Phosphorus.*	*Iodine.*
Sulphur.	*Boron.*	*Metals.*

II. COMPOUNDS.

Sulphurets of Metals.
Oxide of Phosphorus.
Iodides.
Charcoal.
Metallic Oxides.
——————— *with Acids.*
Alloys.
Earths.
——— *with Earths.*
Earths with metallic Oxides.
——————— *fixed Alkalies.*
Solid Acids.
Salts and Hydrosulphurets.
Bitumens, solid Oils.
Soaps.
Most vegetable Substances.
Many animal Substances.

SIMPLE SOLIDS.

a. CARBON. The diamond is carbon in a state of purity; and although charcoal, in its ordinary state, almost invariably contains either hydrogen or water, yet, from the

[1] In drawing up this section, I have borrowed very freely from the third book of *Thomson's System of Chymistry.*

experiments of Tennant, confirmed by those of Messrs. Allen and Pepys, it is probable that charcoal is essentially as pure carbon as the diamond, and that the hydrogen it evolves depends on water, which it always absorbs on the shortest exposure to the air. It has the power of absorbing many gases, for which it has no chymical affinity. Carbon is a constituent of almost all vegetable and animal substances. The equivalent of carbon is = 6·12.

b. SULPHUR. A brittle, greenish yellow, volatile solid, odorous when rubbed, nearly tasteless, having a sp. gr. 1·99. It forms a hydrate with water, from which it cannot be wholly freed. It fuses at 216°, and at 300° powerfully attracts oxygen. The equivalent of sulphur is = 16·1. For its properties, see PART II.

c. PHOSPHORUS is semitransparent, when pure, almost colourless, but generally of a yellowish red or amber colour, and a waxy consistence. Its specific gravity is 1·770. It is nearly insoluble in water, and is so soft that it may be cut with a knife. It is brittle at a temperature under 32°. Above that point it softens, and under 90° is very ductile. It fuses at 108°; in close vessels is volatilized at 219°; and boils at 550°. Exposed to the air at common temperatures, it undergoes slow combustion, and emits a white smoke, which is luminous in the dark, has an alliaceous odour, and condenses to an acid. It is obtained from urine, bones, and other animal matters.[1] The equivalent of phosphorus is = 15·7.

d. BORON is obtained from the decomposition of boracic acid, in the form of powder, of a deep olive colour, insipid, inodorous, and insoluble in water, alcohol, ether, and oils. It undergoes no change at any temperature, when heated in close vessels; but takes fire and burns like charcoal, when heated in the air to about 600°. During combustion it attracts oxygen, and is converted into boracic acid. It is also converted into that acid by decomposing nitric acid, when it is treated with it. Its equivalent is = 10·9.

e. IODINE is obtained in the form of crystalline, blackish-blue scales and plates, having a metallic lustre, soft and friable; sp. gr. 3·0844; it fuses at 225° Fahrenheit, and boils at 347°: its vapour is of a rich violet colour; its taste acrid; its odour similar to that of chlorine diluted in air: it is very

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1 For experiment, the simplest mode of obtaining phosphorus is to mix a solution of phosphate of soda with a solution of acetate of lead, in the proportion of one part of the former salt to one quarter of the latter. This will yield a precipitate of phosphate of lead, from which phosphorus may be obtained by distillation. *Henry's Elements of Chymistry*, vol. ii. p. 7.

soluble in alcohol and ether: scarcely in water. It gives a blue colour to starch. Its equivalent is = 126·3.[1]

f. METALS are simple inflammable bodies, of various specific gravity, density, and opacity; and, as the results of these qualities, possess great brilliancy or lustre from their power of reflecting almost all the light which falls upon their surface. Their colours are, generally, shades of white, grey, or yellow: their hardness is considerable; and, according to its degree, they are more or less elastic. One metal only, Mercury, is in a fluid state at the ordinary heat of the air. Many metals possess considerable tenacity, and are consequently malleable and ductile; but some are extremely brittle. They are sapid and odorous when heated or rubbed; their fracture is generally hackly; their texture fibrous or foliated; and many of them are sonorous. They are excellent conductors of caloric, electricity, and galvanism. When exposed to the action of caloric, they expand and are melted; but differ greatly with regard to fusibility. Some of them are volatilized at known temperatures; while others are fixed at every known temperature. When fused, their surface is convex and globular; and in cooling, they generally crystallize. They are very susceptible of oxidizement. The following metals or their compounds are used as pharmaceutical agents:—

I. MALLEABLE.

1. Silver. (*See Part* ii.)
2. Mercury. (*Ibid.*)
3. Copper. (*Ibid.*)
4. Iron. (*Ibid.*)
5. Tin. (*Part* ii.)
6. Lead. (*Ibid.*)
7. Zinc. (*Ibid.*)
8. Potassium is obtained by decomposing pure carbonate of potassa, by means of charcoal. It has the metallic lustre of silver, is soft and malleable at 50°, but at 32° is hard and brittle. Its sp. gr. at 60° is 0·865. It becomes somewhat fluid at 70°, quite fluid at 150°, and at a red heat is converted into vapour. It combines rapidly with oxygen, and forms *potassa*. Its equivalent is = 39·15.
9. Sodium, obtained by decomposing soda, has the lustre of lead, is very soft and malleable at 60°, and retains these properties at 32°. Its sp. gr. is 0·972. It fuses at 200°; and requires a higher temperature to be volatilized than potassium. It combines rapidly with oxygen, and forms *soda*. Its equivalent is = 23·3.

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1 Turner.

10. Calcium, obtained from lime, is yet imperfectly known. Combined with oxygen it forms *lime*. Its equivalent is = 20·5.
11. Barium, obtained by decomposing baryta, is a metal of a dark grey colour, with a lustre approaching to that of cast iron; it fuses at a low heat, but is not volatilized in a heat capable of melting plate glass. Combines rapidly with oxygen, and forms *baryta*. Its equivalent is = 68·7.
12. Magnesium is a solid metal. Little is known of its properties; it burns with brilliancy in oxygen gas, and is converted into *magnesia*. Its equivalent is = 12·7.
13. Aluminium is procured from chloride of aluminium, in the form of a grey powder. When heated to redness in the air, it burns, and is converted into *alumina*. Its equivalent is = 13·7.

II. BRITTLE AND EASILY FUSED.

1. Bismuth. (*Part* ii.)
2. Antimony. (*Ibid.*)
3. Arsenic. (*Ibid.*)

III. BRITTLE AND DIFFICULTLY FUSED.

1. Manganese. (*Part* ii.)

COMPOUNDS.

a. COMPOUNDS OF SULPHUR.

1. *Sulphurets of Metals* are compounds of sulphur and metals, often possessed of metallic brilliancy, opaque, and brittle. They are conductors of electricity. Four of them only are officinal.

Table of Officinal Sulphurets of Metals.

Sulphurets.	Colours of the Sulphurets.	Specific Gravity.	Prop. of Sulphur.	Prop. of Metal.	Equivalent.
Mercury	1. Black	8·16	1 = 16·1	1 = 200	= 216
	2. Red		2 32·2	1 = 200	= 232
Iron	1. Yellow	4·518	1 16·1	1 = 28	= 44
	2. Yellow	4·830	2 = 32·2	1 28	= 60
Antimony	Leaden grey	4·368	$1\frac{1}{2}$ = 24·1	1 = 64·6	= 88·6
Potassium	1. Red	—	1 16·1	1 = 39·15	= 55·25
	2. Red	—	2 32·2	1 = 39·15	= 71·35
	3. Brown	—	3 48·3	1 = 39·5	= 87·45
	4. Brown	—	4 = 64·4	1 = 39·5	= 103·55

Officinal. Sulphuret of potassium. (*Part* ii.)

2. *Hydrosulphurets* are solutions of the sulphurets in water, which are decomposed by the atmosphere and acids.

b. COMPOUNDS OF PHOSPHORUS.

1. *Oxide of Phosphorus*, produced on phosphorus when it is kept under water, in the form of white film; and also, by heating phosphorus in highly rarified air, when it assumes the form of red flakes, which take fire when slightly heated, and burn with a very vivid flame. By further exposure to the air they attract moisture, and are converted into an acid.

c. CHARCOAL? (*Part* ii.)

d. METALLIC COMPOUNDS.

1. *Alloys* are compounds of two or more metals. They have generally lustre, hardness, tenacity, ductility, and other properties of the metals; but these properties in alloys differ from those of the metals from which they are formed. The compounds of mercury with other metals are named *amalgams*.
2. *Metallic oxides* are generally in the form of powders, or friable fragments, not at all resembling the metals; sometimes laminated and crystallized; of various colours, determinate with regard to the metals and their treatment; heavier than the metals; and refractory, or fusible into glass. Some are insipid, others acrid and styptic. In general they are insoluble in water, and combine with acids, or with alkalies, or with both at the same time. They are reducible by light, caloric, hydrogen, carbon, oils, &c.[1]
3. *Metallic sulphurets.*
4. *Metallic iodides.*
5. *Metallic cyanides.*
6. *Earths.* (*Part* iii.)
   Earths with earths.
   ——— *alkalies.*

e. SOLID ACIDS *and* SALTS, in a crystallized state, contain a portion of water in their composition. The following are objects of pharmacy, or officinal:—

1. *Phosphoric acid* is solid, colourless, transparent, and resembles glass in appearance, but, more usually, it is some

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[1] As the same metal is susceptible of different degrees of oxidizement, it has been found necessary to designate the oxides thus formed by distinct appellations, indicative of the comparative quantity of oxygen with which the metals thus formed are combined. The terms *protoxide, deutoxide, tritoxide,* and *peroxide* imply that a metal is in its first, second, third, and ultimate stage of oxidizement.—These terms were proposed by Dr Thomson.

what opaque, or resembles enamel; is inodorous, very acid, reddens vegetable blues, and deliquesces when exposed to the air. Its specific gravity in a state of dryness is 2·687. It is very soluble in water, dissolving with a hissing noise; but, nevertheless, much heat is not evolved. It is decomposed at a high temperature by hydrogen, charcoal, and several of the metals. The composition of phosphoric acid is 31·4 or 2 eq. of phosphorus, and 40 or 5 eq. of oxygen. Equivalent = 71·4. It is officinal in its diluted state. (*Part* iii.)

Phosphate of lime is found very abundantly in the native state. It constitutes the basis of bones, from which it is procured in the state of a white powder, by calcination and solution in muriatic acid, from which it is precipitated by ammonia. It is inodorous, insipid, and insoluble in water; soluble in an excess of phosphoric acid; decomposed by several of the acids. Exposed to a heat of 378° Wedgwood, it softens, and changes to an enamel. 100 parts contain about 71·4 of acid, and 28·5 of lime. Equivalent = 99·9.

Phosphate of soda. (*Part* iii.)

2. *Boracic acid* is obtained in the form of white, thin, irregularly hexagonal scales, greasy to the feel. It reddens vegetable blues, is inodorous, has a sour bitterish taste, and leaves a cooling sweet impression in the mouth. Its specific gravity is 1·479. It swells up when exposed to the fire, and melts into a hard transparent glass. Boiling water dissolves only two parts of boracic acid: alcohol dissolves it, and the solution burns with a green flame: oils also dissolve it with the assistance of heat. It oxidizes only iron, zinc, and perhaps copper. Its components are, 10·9 or 1 eq. of boron + 24, or 3 eq. of oxygen. Equivalent = 34·9.

Biborate of soda. (*Part* iii.)

3. *Benzoic acid.* (*Ibid.*)

4. *Succinic acid.* (*Ibid.*)

5. *Oxalic acid*, generally obtained by treating sugar with nitric acid, is in the form of white, transparent, shining, four and six sided prisms, which have a very acid taste, redden vegetable blues, and are soluble in their own weight of boiling water. The solution of one part of the acid in 3600 parts, by weight, of water, is perceptibly acid to the taste. Exposed to heat in open vessels, it is decomposed. The dry acid is a compound of 12·24, or

2 eq. of carbon, and 24, or 3 eq. of oxygen.[1] Oxalic acid has been swallowed by mistake for Epsom salts, and has produced fatal effects in many instances. I was the first who ascertained, by experiments on dogs and rabbits, that it acts on the stomach like other corrosive poisons; and that a mixture of chalk and water is the best antidote.[2] Equivalent = 36·24.[3]

6. *Tartaric acid.* (*Part* iii.)
Tartrate of potassa. (*Ibid.*)
Variety. *Bitartrate of potassa.* (*Part* ii.)
Tartrate of potassa and soda. (*Part* iii.)

7. *Citric acid.* (*Ibid.*)

f. BITUMENS. (*Part* ii.)

g. SOAPS. The true nature of these compounds has been illustrated by Chevreul. He found that the fatty matter they contain consists of two distinct substances, which he has named *Steärin* and *Eläin.* These, by the action of salifiable bases, are converted into two acids, the *margaritic* and the *oleïc;* and soaps are merely combinations of one or both of these acids, with alkaline, earthy, or metallic bases. 1. The alkaline soaps have a peculiar unpleasant odour and taste; form a milky solution with water, and a transparent one with alcohol; are powerfully detergent, and are decomposed by the earthy and the metallic salts. 2. The earthy soaps are insoluble in water, and not detergent. 3. Metallic soaps are likewise insoluble in water, but some of them are soluble in alcohol, and others in oil.

1. *Hard soap.* (*Part* ii.)
2. *Soft Soap.* (*Ibid.*)
Variety. *Liniment of ammonia.* (*Part* iii.)
3. *Liniment of Limewater.* (*Ibid.*)

h. SOLID VEGETABLE SUBSTANCES. It is necessary to notice in this place the solid proximate principles only of the vegetable substances which are officinal, or employed as pharmaceutical agents. The constituents of the whole of them are — carbon, hydrogen, oxygen, and nitrogen, in different proportions.

1. *Sugar.* (*Part* ii.) It is soluble in nitric acid, decomposing it and forming oxalic acid. When treated with chlorine, sugar is changed into malic acid.

Varieties. a. *Sugar of figs,* found concrete on the outside of the dried fruit.

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[1] *Annals of Phil.* vol. v. p. 99.
[2] See *London Med. Repository,* vol. iii. p. 382.
[3] Berzelius.

b. *Sugar of grapes,* — found crystallized in some kinds of raisins. When artificially extracted from the juice of the grape, it is white and crystallized, but less sweet than common sugar. Pure cane sugar is a compound of 42·85 carbon + 6·35 hydrogen + 50·8 oxygen.[1]

c. *Sugar from starch:* — its crystals are small spherical granules. When dissolved in water, it ferments with the addition of yest.

d. *Mushroom sugar:*—its crystals are four-sided prisms, with square bases; very crystallizable: digested with nitric acid, it yields abundance of oxalic acid.

e. *Manna?* besides a very pure saccharine matter, which has been named mannite, it contains mucilage, and a nauseous substance to which it owes its purgative properties. When digested with nitric acid, it yields saclactic as well as oxalic acid. It does not ferment like sugar.

2. *Sarcocoll* is usually in oblong, semi-transparent, yellow globules, which have a bitter sweet taste, and an odour resembling in some degree that of anise seed. It does not crystallize. Soluble in water and alcohol. Its aqueous solution is precipitated by tannin. Treated with nitric acid, it yields oxalic acid.

Variety. *Liquorice?* dissolves in nitric acid, and forms tannin; and, when treated with sulphuric acid, yields about one fourth of its weight of charcoal. It is not susceptible of fermentation.

3. *Gum.* (*Part* ii.)

Officinal. Acacia Gum.

Varieties. a. *Gum Senegal,*—in larger masses than gum arabic, and darker coloured. It is often mixed with gum arabic.

b. *Gumkuteera,*—in loose, wrinkled, transparent drops, inodorous and insipid; scarcely soluble in cold water, but completely so in boiling water.

c. *Mucus,*—inodorous, insipid, soluble in water, insoluble in alcohol; not precipitated by silicated potash, but precipitated by alcohol in a fibrous state.

Officinal. Linseed mucus, Quince-seed mucus, Marsh-mallow mucus.

4. *Cerasin.* This substance, which was formerly confounded with gum, is supposed to be the produce of the Astragalus *tragacantha.* (For its physical properties, see *Part* ii.) With nitric acid it yields saclactic, malic, and oxalic acids.

Officinal. Tragacanth.

Varieties. a. *Cherry-tree gum,*—partially soluble only in water. When treated with nitric acid, it yields saclactic acid.

b. *Congo gum?*

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[1] Prout.

c. *Dominica gum,*—in large masses like stalactites, brittle, light yellowish brown, translucent. It contains three parts of cerasin and one of gum.

d. *Bassora gum.*

Variety. *Salep,*—from the bulb of Orchis *mascula.*

5. *Ulmin.*[1] This is a spontaneous exudation from the elm; but, as Berzelius has hinted, is probably a component of every bark. It is solid, black, hard, shining, and insipid. It is sparingly soluble in water, but does not form mucilage; nearly insoluble in alcohol; precipitated by nitric acid and chlorine, in the state of resin.

6. *Inulin* is obtained from the Inula *helenium* in the form of a white powder, which is insoluble in cold water and in alcohol. It is soluble in boiling water, forming a mucilaginous solution; but precipitates as the solution cools. With iodine, it forms a greenish-yellow, perishable compound. Treated with nitric acid, it yields malic and oxalic acids.

Officinal. Elecampane root.

7. *Starch.* (*Part* ii.)

Varieties. a. *Potato starch* has a perceptibly crystallized aspect; is more friable and heavier than common starch.

b. *Indian arrow-root* has all the properties of common starch; prepared from the roots of Maranta *arundinacia.*

c. *Sago,* in gray granules. It is the prepared pith of a palm, the Cycas *circinalis.*

d. *Casava,* prepared from the root of the Iatropha Manihot.

e. *Tapioca,* in granules.

All these varieties of starch are very nutritive and excellent food for the sick and convalescent.

8. *Gluten* is of a gray colour, nearly insipid, and inodorous, very tenacious, ductile, and elastic; partially soluble in water, and soluble in acetic and muriatic acid. Insoluble in alcohol and ether. M. Taddei has ascertained that it may be decomposed into two principles — which he has named *Gliadine* and *Zimome.* When gluten is rubbed with powdered guaiac, a blue colour is evolved. When treated with nitric acid, it yields oxalic acid.

9. *Fibrin* is tasteless, fibrous, elastic, and resembles gluten. It is insoluble in water, alcohol, and diluted alkali; but is soluble in acids, particularly nitric acid. It soon putrefies.

10. *Extractive* is obtained by evaporating aqueous vegetable infusions to dryness. It has a strong taste; and is soluble

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1 So named by Dr. Thomson.

in water; but insoluble in alcohol and ether, unless when the extractive is united with resin. It is precipitated from its solutions by chlorine and protochloride of tin, but not by gelatin,

Officinal. Catechu, most barks, &c.

11. *Tannin* (tannic acid) is colourless and inodorous when pure; has an astringent taste, is soluble in water, in ether, and in alcohol of 0·810. It gives an acid reaction with litmus, and is usually combined with gallic acid. It is precipitated by gelatin. It is a compound of 110·16, or 18 eq. of carbon + 9, or 9 eq. of hydrogen + 96, or 12 eq. of oxygen. Equivalent = 215·16.

Officinal. Rhatany root, Galls, Uva Ursi, Tormentil, Rhubarb, Cinchona barks, Swietenia, Simarouba, Kino, Catechu, Willow bark.

12. *Wax* is a fixed oil: it consists of two distinct parts, one of which is termed *Cerine*, the other *Myricine*. (*Part* ii.)

13. *Camphor.* The ultimate components are carbon, hydrogen, and oxygen. (*Part* ii.)

14. *Scillitina.* This substance is procured from the bulb of the Squill. It is white, transparent, and pulverulent; has an intensely bitter taste, leaving a sweetish impression on the palate. It is soluble in water and alcohol, and when heated swells and exhales the odour of calomel. It is not a simple substance.

Officinal. The bulb of the Squill.

15. *Quassina* is the pure bitter of Quassia.

Officinal. Quassia wood; Simarouba bark.

16. *Daphnia*, procured from the bark of the Daphnè *Mezereum.*

Officinal. Bark of Spurge Laurel.

17. *Nicotina* is obtained from the leaves of several species of Nicotiana. It is colourless, acrid, and burning to the taste, and has the odour of tobacco; is soluble in water, alcohol, and ether; and approaches the volatile oils in its properties. It is extremely poisonous. It has an alkaline reaction, and forms crystallizable salts with acids.

Officinal. Tobacco leaves.

18. *Cathartina* is the active purgative principle of Senna. It is uncrystallizable, of a reddish yellow colour; has a bitter nauseous taste, a peculiar odour; and becomes moist in the air. It is insoluble in ether, but soluble in alcohol and water in all proportions.

Officinal. Senna leaves.

19. *Resins* are brittle, semi-transparent, yellowish substances, inodorous, and having an acrid taste. Their specific gravity varies from 1·0452 to 1·2289. They melt when heated, inflame in a higher temperature, and burn with a strong yellow flame, emitting much smoke. They are insoluble in water; but soluble in alcohol, ether, alkalies, and acetic acid. Nitric acid converts them into artificial tannin.

Officinal. Amber, copal, pine resins, mastiche.

20. *Guaiacum* differs from resins in being soluble in nitric acid, and when treated with it, in yielding oxalic acid, and no tannin. (See *Part* ii.)

21. *Hematina* is the colouring matter of Logwood. It is procured in small brilliant crystals of a reddish white colour. Their taste is bitter, acrid, and slightly astringent. They form an orange red solution with boiling water: alkalies in excess change them first to purple, then to violet, and, lastly, to brown; and the hematina is decomposed. (See *Part* ii.)

Officinal. Logwood and its extract.

22. *Emetina.* This substance is obtained from Ipecacuanha and some other roots, which have an emetic property. It is, when pure, in the form of white scales, inodorous, but having a bitter and slightly acrid taste. It is not very soluble in water, but is readily dissolved in alcohol, and is soluble in acetic acid, and all the other acids, with which it forms salts. It is insoluble in ether. Nitric acid converts it into oxalic acid. Half a grain, when swallowed, excites full vomiting. It is a compound of 64·57 of carbon + 7·77 hydrogen + 4 nitrogen + 22·95 oxygen in 100 parts.[1]

Officinal. Ipecacuanha root.

23. *Cinchonia*, an alkaline salt, obtained from the bark of the Cinchona *lancifolia* and *oblongifolia.* It is inodorous, has little taste unless it be dissolved in alcohol; is white, translucent, and crystalline. It is scarcely soluble in water, ether, or oils, but is very soluble in alcohol. It unites

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[1] To obtain *Emetin,* treat powder of Ipecacuanha, with ether at 63°, as long as it acts upon it: then boil the powder several times with fresh quantities of alcohol at 40°, and filter the boiling solutions, which will throw down as they cool a white flocculent precipitate: filter again, and evaporate the clear solution in a water-bath. Dissolve the reddish residue which will be obtained in cold water, and add magnesia, which will precipitate the *Emetin,* that may be now obtained in a state of purity by dissolving the precipitate in alcohol, and evaporating the solution to dryness.

with all the acids, and forms soluble salts. It is a compound of 122·4, or 20 eq. of carbon + 12, or 12 eq. of hydrogen + 14·5, or 1 eq. of nitrogen + 8, or 1 eq. of oxygen. Equivalent 156·55. (*Part* iii.)

24. *Quina*, an alkaline salt procured from the bark of Cinchona *cordifolia* and *oblongifolia*. Inodorous, very bitter, white, little soluble in water, very soluble in ether. Combines with acids, and forms soluble salts. It consists of 122·4, or 20 eq. of carbon + 12, or 12 eq. of hydrogen + 14·15, or 1 = of nitrogen + 16, or 2 eq. of oxygen.

25. *Salicina*, a salt procured from the bark of the Salix *Felix*, Populus *tremula*, &c. It consists of 12·24, or 2 eq. carbon + 2, or 2 eq. of hydrogen + 8, or 1 eq. of oxygen.

26. *Picrotoxa* is procured from the fruit of the Menispermum *cocculus*, in white, four-sided, prismatic crystals; of an intensely bitter taste, soluble in twenty-five times their weight of water, and in three times their weight of alcohol and of ether. It is insoluble in oils. Nitric acid converts it into oxalic acid. It is intoxicating, and poisonous when swallowed. It consists of 61·434 of carbon + 6 of hydrogen + 32·426 of oxygen, = 100·00.

Officinal. Cocculus *Indicus*.

27. *Morphia*. This is an alkaline substance procured from opium. It is in white pyramidal crystals, scarcely soluble in boiling water, but very soluble in alcohol and ether. It combines with the acids, forming neutral salts. It acts with great energy on the animal economy. (See *Part* ii.)

Officinal. Opium.

28. *Aconita*, an alkaline substance, procured from the Aconitum *Napellus*, on which the poisonous qualities of that plant are supposed to depend. (See *Part* ii.)

Officinal. Aconitum *Napellus* and its extract.

29. *Atropia*, an alkaline substance, on which the poisonous and active properties of Belladonna depend. (See *Part* ii.)

Officinal. Atropa *Belladonna* and its extract.

30. *Delphia*, an alkali, the active principle of Delphinium *Staphisagria*. (See *Part* ii.)

31. *Hyoscyama*, an alkali, the active principle of Hyoscyamus *niger*. (See *Part* ii.)

32. *Daturia*, the active principle of Datura *Stramonium*.

33. *Veratria*, an alkali, the active principle of Veratrum *album*, and Colchicum *autumnale*. (See *Part* ii.)

34. *Strychnia*, an alkaline substance, the active principle of Nux vomica. It is white, granular, inodorous, extremely

bitter, insoluble in ether, slightly soluble in cold water, but very soluble in alcohol. Forms a class of salts with acids, which are most virulent poisons.

35. *Conia*, the active part of Conium *maculatum;* resembles a volatile oil, of a pale yellow colour: is rapidly decomposed when exposed to the air.

Officinal. Conium and its preparations.

36. *Piperina*, one of the active principles of Black Pepper and of Chamomile flowers.[1]

37. *Elatina*, the active principle of Elaterium. (See Momordica, *Part* ii.)

38. *Cytissina*, the active principle of Arnica *montana*, and Asarum *Europæum.*

39. *Balsams* resemble resins in their appearance; have a strong aromatic odour; yield benzoic acid when heated, or dissolved in sulphuric acid; and when treated with nitric acid, yield artificial tannin.

Officinal. Balsams of Peru, tolu, benzoin, storax.

40. *Gum resins* resemble resins in their appearance; but they are odorous, and form milky solutions with water, and transparent solutions with alcohol. They are soluble in alkalies.

Officinal. Ammoniacum, galbanum, scammony, assafœtida, myrrh, sagapenum, gamboge.

41. *Wood*, which forms the support of all vegetables, is composed of tasteless fibres, insoluble in water and alcohol, but soluble in weak alkaline ley, and in nitric acid, yielding oxalic acid. When distilled *per se*, at a red heat, it leaves much charcoal and acetic acid.

i. SOLID ANIMAL MATTERS.

1. *Albumen* when dried is a brittle, transparent, glassy substance, resembling gum in appearance. It is soluble in cold water; and when the solution consists of one part of dry albumen and nine of water, heat coagulates it into a firm, white, solid mass. Alcohol, ether, the strong acids, bichloride of mercury, many metallic oxides, and tannin, also coagulate the solution.

Officinal. White of egg, hartshorn shavings.

2. *Solid oils* are composed, like the other fixed oils, of a solid and a fluid substance, which Chevreul has named *Steärin* and *Eläin.*

[1] I first ascertained its presence in Chamomile flowers.

Varieties. a. *Spermaceti.* (*Part* ii.)

b. *Fat* is an odorous, insipid, white, crystalline substance; greasy to the touch; melts at 140°; vaporized at 400°, the vapour being inflammable; insoluble in water, alcohol, and ether; combines with alkalies, and forms soap; and is decomposed by strong acids.

Officinal. Lard, mutton suet, fat.

3. *Cantharidin* is the active principle of Spanish flies. (See *Part* ii.)

   Officinal. Cantharis *officinalis.* Mylabris *variabilis.*

4. *Cochinilin* is the colouring principle of the Cocus *Cacti.* (See *Part* ii.)
5. *Castor.* (*Ibid.*)
6. *Musk.* (*Ibid.*)
7. *Bones* and *Shells.* (*Ibid.*)
8. *Horn.* (*Ibid.*)

COMBINATION OF SOLIDS WITH SOLIDS.

Although solid bodies may be made to enter into combination with one another, yet all do not combine in the same manner, and under similar circumstances. Thus, some unite in any proportion, and some in certain determinate proportions only; while others will not combine with each other under any circumstances.

1. TABLE *of the principal pharmaceutical Solids which have been ascertained to be capable of uniting in any proportion.*

Sulphur with phosphorus.
Metals with most metals.
Protoxide of antimony with sulphuret of antimony.
Earths with earths.
Earths with some metallic oxides.
Some earths with fixed alkalies.
Solid oils with each other, and with bitumen.

All the products are solids, except those resulting from the union of sulphur and phosphorus, which are liquid.

None of these solids combine spontaneously, even although placed in contact; but require to be mixed, and exposed to a degree of heat capable of melting one or both of them; in which case, the caloric breaking the force of the cohesive attraction which retains the particles of the solids in the aggregate state, the atoms of the one substance are brought into immediate contact with those of the other, or within the sphere of the attraction of affinity, which consequently acts and produces the new compound. The compounds do not very materially differ in their properties from their constituents, except the compounds of iron with carbon, and some of the earths with each other. The combination is generally accompanied with a change of density.

2. TABLE *of the principal pharmaceutieal Solids which have been observed to unite only in determinate proportions.*

Iodine with metals.
Sulphur with metals.
Fixed alkalies ?
Phosphorus with carbon.
——————— metals.
Acids with alkalies.
———— metallic oxides, &c.

These enter into more intimate union than the preceding. They, however, do not unite when both bodies remain in the solid state; "except sulphur and the fixed alkaline hydrates[1], some acids, and a few hydrates of metallic oxides:" hence they are brought into union, either by *fusion*, or by *solution in water*, or in some other liquid menstruum. By the first mode "sulphur is made to combine with metals, and fixed alkalies, and phosphorus with metals:" by the second, the acids are combined with the alkalies, and the other metallic oxides. The mode of union resembles that of liquids with solids in every respect.

It is important to ascertain the *proportions* in which these bodies unite, and their *change of density*. Berthollet is of opinion, that sulphur may unite indefinitely with the metals, the proportion of sulphur varying indefinitely in many native sulphurets; but Dr. Thomson [2] maintains the contrary opinion, owing to the circumstance, "that when sulphur and a metal are fused together, we obtain always the two bodies combined in determinate proportions."

Table 1. exhibits the composition of the iodides; table 2. that of the sulphurets of the officinal metals.

The first column in the table of the sulphurets gives the specific gravity of the sulphuret; the second, the weight of sulphur united to 100 parts of the metal; the third, the atomic equivalents; the fourth, the colour of the sulphuret.

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[1] These are alkalies in the crystalline form, or containing water solidified.
[2] *System of Chymistry*, 4th edit. iii. 136.

Table 1.—IODIDES.

Metals.	Character.	Composition.	Equivalents.	Colour.
Silver -	Protiodide	1 Silver = 108 + 1 Iod. = 126·3 -	= 234·3	Greenish yellow.
Bismuth	Periodide	1 Bismuth = 71 + 2 Iod. = 252·6 -	= 323·6	Dull yellow.
Arsenic -	Periodide	2 Arsenic = 75·4 + 5 Iod. = 631·5	= 706·9	Deep red.
Mercury	Protiodide	1 Mercury = 202 + 1 Iod. = 126·3	= 328·3	Greenish yellow.
	Biniodide	1 Mercury = 202 + 2 Iod. = 252·6	= 454·6	Bright scarlet.
Lead -	Protiodide	1 Lead = 103·6 + 1 Iod. = 126·3 -	= 229·9	Golden yellow.
Antimony	Protiodide	1 Ant. = 64·6 + 1 Iod. = 126·3	= 180·9	Ruby red.
Iron -	Protiodide	1 Iron = 28 + 1 Iod. = 126·3	= 154·3	Iron grey.
Zinc -	Protiodide	1 Zinc = 32·3 + 1 Iod. = 126·3 -	= 158·6	Dull white.

Table 2.—SULPHURETS.

Metals.	Specific gravity.	Weight of Sulphur combined.	Equivalents.	Colour.
Silver -	7·215	14·544	124·1	black
Bismuth -		22·52	= 87·1	blue
		45·		blue
Arsenic -	3·3384	71·42	= 53·8	red
Orpiment sesquisulphuret			= 123·7	yellow
Persulphuret -			= 155·9	yellow
Copper -		25·	= 47·7	black
Mercury	8·16	16·	= 218·1	black
		32·	= 234·2	red
Tin -		16·	= 74·	blue
		32·	= 90·1	yellow
Lead -	7·602	32·	= 119·7	black
Antimony	4·368	24·	= 177·5	leaden gray
Iron -	4·518	16·	= 44·1	black
	4·5	32·	= 60·2	yellow

The metallic sulphurets are rarer than the mean of their components, owing to the substances expanding, during their union, sometimes more than one fifth of the whole. Pyrites, however, is an exception, its specific gravity being greater than the mean.[1]

Nothing precise is known of the other combinations of sulphur, nor of those of phosphorus with solid bodies.

The combinations of the acids with alkalies, earths, and metallic oxides, are well understood. When an acid and an alkali are mixed together, we find that, after several small additions of the alkali to the acid, diluted with a little water, the mixture still retains acid properties; but by continuing to add the alkali these disappear, and alkaline properties are acquired by the next addition that is made; the acid or the alkaline properties of the compound, therefore, predominate according to the proportions of each; but there are certain proportions, according to which they destroy, by their union, the properties of each other, so that neither predominates. In this case they are said to *neutralize* each other; the products are named *neutral salts*, and the proportions in which the acids and alkalies unite to form neutrals are fixed and determinate.

All salts, however, are not neutrals; but in some, the proportions of the acid,—in others, that of the base, predominate. The former, which are named *super-salts*, or *bisalts*, are supposed to be compounds of two or more atoms of the acid with one of the base; and the latter, which are named *sub-salts*, of two atoms of the base with one of the acid. Thus, bitartrate of potassa consists of one atom of potassa $=47{\cdot}15$ united to two of tartaric acid $=132{\cdot}96$, with 1 of water $=9{\cdot}$; making the equivalent of the salt $=189{\cdot}11$; or, by weight, of 5·23 parts of base, and 100 of acid[2]; while carbonate of potassa consists of one atom of potassa $=47{\cdot}15$, and one of carbonic acid $=22{\cdot}12$, making the equivalent of the salt $=69{\cdot}27$, or, by weight, of 2·75 of acid and 6·00 of base. *Triple salts* are composed of one acid united to two bases at the same time,—as the tartaric acid, for instance, with potassa and soda, to form the tartrate of potassa and soda; the equivalent of which in its crystalline state is $=283{\cdot}41$.

The metalline salts are seldom neutral, having generally an excess either of acid or of base.

II. LIQUIDS.

It has been already observed, that by throwing caloric into a solid body, or, in other words, heating it, the force of the

[1] Vauquelin. [2] Berzelius.

attraction of cohesion, which preserved it in the solid state, is gradually weakened, and finally overcome. When the particles of a body which, at a low temperature, were immovable relatively to each other, are separated by interposed caloric, so as to move easily upon one another, but are yet within the limits of the sphere of the attraction of aggregation, the body is denominated a *liquid*, provided it remain in this state under the medium temperature of the atmosphere. Thus *Ice*, when brought into a place, the temperature of which exceeds 32°, loses its solidity and becomes a liquid, or water, which form it retains in every degree of temperature between 32° and 212° on the scale of Fahrenheit's thermometer. Let us now examine the constitution of liquids, their combinations with other liquids, and their combinations with solids.

1. OF THE CONSTITUTION OF LIQUIDS.

Liquids, as we have explained, are compounds of caloric with a solid base. Their parts move easily upon one another, and yield to the smallest impression; but they are not sensibly elastic. The greater or smaller degree of liquidity of different substances depends upon a difference of the force of cohesion exerted between their particles, which may be regarded as placed in the limit between attraction and repulsion: thus the cohesion of mercury is greater than that of water. Liquids differ very much in specific gravity; and the degree of this bears a relation to their density. "The distances of the atoms are so regulated, that the attraction and repulsion by which they are at once actuated just balance one another; while their form, which is supposed to be spherical, is such, that they can move freely along each other without altering these distances. It is this which seems to constitute the real cause of liquidity."

All liquids may be arranged into two great classes. The following Table exhibits a list of almost the whole of them, arranged according to their composition:—

I. SIMPLE.

Mercury. (*Part* ii.)	sp. gr. 13·545
Bromine.	5·540

II. COMPOUND.

a. Simple gases combined.

Water.	1·000
Nitric acid. (*Part* iii.)	1·500

b. Gases with a solid base.

Sulphuric acid. (*Part* ii.) .... sp. gr.	1·847
Alcohol (*absolute*). (*Part* iii.)	0·796
Ethers. (*Ibid.*)	0·632 to 0·900
Volatile oils. (*Ibid.*)	0·792 to 1·094
Fixed oils. (*Ibid.*)	0·913 to 0·968
Petroleum. (*Part* ii.)	0·730 to 0·678

If mercury and bromine be excepted, all the known liquids are compounds, and the greater number of them contain water as an ingredient.

Water. The ordinary appearances and properties of this liquid are too well known to require description. Its maximum of density is at the temperature of 36°. A cubic foot of it, at 30 inches of the barometer, and 55° of the thermometer, weighs 998·74 avoirdupoise ounces of 437·5 grains troy each. Its specific gravity is supposed = 1·000, and it is made the standard of unity in the measurement of that of every other liquid. The gravity of ice is less than that of liquid water. It conducts heat slowly, conducts electricity imperfectly, and is a powerful refractor of light. In the form of steam, under a pressure of 28 inches of mercury, water occupies 1800 times the space which it does in the form of water. It is not decomposed by heat alone; nor altered by light: but it is decomposed by iron, zinc, antimony, and tin, when assisted by heat. It readily absorbs air and gases [1], and is a constituent of all gases. It is a compound of oxygen and hydrogen, 100 grains containing 88·9 of oxygen, and 11·1 of hydrogen [2]: or its constitution may be thus stated:—

	By weight.	By volume.
Oxygen..........................	8 = 1.	1
Hydrogen........................	1 = 1.	2
Equivalent	9	

It liquefies a great number of solid bodies, its solvent power being increased by diminishing the pressure of the atmosphere; and, as has been already stated, the greater number of liquids contain it as an ingredient. It is also present in some compounds, in fixed definite proportions, forming *hydrates*.

[1] From Mr. Dalton's experiments, it appears that water absorbs its own bulk of carbonic acid gas, of sulphureted hydrogen gas, and of nitrous oxide; $\frac{1}{27}$ of oxygen gas, nitrous gas, and carbureted hydrogen; and $\frac{1}{8}$ of carbonic oxide, azotic gas, and hydrogen gas.

[2] Biot and Arago.

2. COMBINATION OF LIQUIDS WITH ONE ANOTHER.

When liquids are mixed together, they either unite in all proportions, or in certain determinate proportions only; or they cannot be united, but separate, howsoever carefully they be mixed together; or they decompose one another.

I. TABLE *of pharmaceutical Liquids which unite when mixed together in all proportions, and do not afterwards spontaneously separate.*

Water with alcohol.
———— nitric acid.
———— sulphuric acid.
Alcohol with ether.
———— with some volatile oils.
Sulphuric acid with nitric acid.
Fixed oils with petroleum.
———— volatile oils.
———— fixed oils.
Volatile oils with petroleum.
———— volatile oils.

When these liquids are mixed together, such a mutual penetration takes place, that every portion of the mixture contains the same proportions of both ingredients; and this is the case, although there may be the greatest difference in the specific gravity of the individual liquids. Agitation assists the rapidity of this effect very much, but the mixture is never perfect until some time afterwards. If, on the contrary, agitation be not employed, the mixture is always more quickly effected when the denser liquid is added to the rarer; for in the opposite case a long period often elapses before it is completed. A partial muddiness occurs when even transparent liquids of different densities are mixed together, and continues until the mixture be perfect; but when it is completed, the compound is homogeneous, and the liquids do not afterwards separate from one another.

As the density and specific gravity of a compound thus formed are always greater than the mean, caloric is evolved during the mixture. In some cases the quantity is scarcely sensible; but in other instances it is capable of affecting considerably the thermometer. If fixed and volatile oils be mixed, the temperature is not very sensibly raised; but if alcohol and water are mixed, the evolution of heat is very sensible; and if four parts of sulphuric acid and one part of water, both at 32°, be mixed together, the temperature rises to 212°. When equal parts of sulphuric acid and water are mixed, the density is augmented by 13 per cent.; of nitric acid and water, the increase is equal to $\frac{1}{12}$; and when water and pure alcohol are mixed, it is rather more than $\frac{1}{28}$ of the whole weight. These mixtures are cases of real chymical combination; the force which holds them combined being that of chymical attraction exerted between the integrant particles of the two liquids.

II. TABLE *exhibiting a list of the pharmaceutical Liquids which unite with each other only in certain proportions.*

Water with ether.
——— volatile oils.
Alcohol with some volatile oils.
——— petroleum.
Ether with volatile oils.
——— petroleum.
Volatile oils with petroleum.

Water dissolves rather less than one tenth of its bulk of sulphuric ether; and the proportion of volatile oil it takes up is also very minute, being scarcely more than is sufficient to communicate the odour of the oil to the water, without any other of its properties. Although alcohol unites readily with the volatile oils, yet the quantity of each is limited; and the proportion of petroleum which alcohol dissolves is very small. The proportions of volatile oils and petroleum which ether dissolves are considerable.

The affinity of the compounds of this table is much weaker than that of the former; which, "with the difference between the cohesion of the particles of the two liquids, limits the combination to certain proportions." They are also more easily decomposed; for, if a spirituous solution of volatile oil be poured into water, the alcohol leaves the volatile oil to unite with the water, while the greater part of the separated oil swims on the surface of the new compound.

III. TABLE *exhibiting the principal pharmaceutical Liquids which do not sensibly combine in any proportion.*

Water with petroleum.
——— fixed oils.
Fixed oils with alcohol.
——— ether.
Mercury with water.
——— alcohol.
——— ether.
——— volatile oils.
——— petroleum.

In these cases, the affinity between the two liquids is not sufficient to overcome the cohesion between the particles of each liquid. The spreading of oil, however, upon the surface of water, and adhering to it, is supposed to depend on the exertion of some degree of affinity, although less than is requisite to produce a combination of the two liquids.

If a liquid have an affinity for one of the constituents of another liquid, although not for the liquid itself, it frequently decomposes it, and forms new compounds.

IV. TABLE *of the principal pharmaceutical Liquids which decompose each other.*

Nitric acid by all liquids, except water and sulphuric acid.

Sulphuric acid by all liquids, except nitric acid and water.

The combinations of solids reduced to the liquid state are regulated by the very same laws as those of proper liquids.

3. OF THE COMBINATION OF LIQUIDS WITH SOLIDS.

The principal liquids, the action of which upon solids has been examined, are *water*, *alcohol*, *ether*, *petroleum*, *volatile oils*, *fixed oils*, *mercury*, *alkalies*, and the *acids* which have been already noticed.

a. Water enters into combination with solid bodies in two states. In the first, the proportion of solid matter exceeds that of water, and the liquid becomes a part of the solid body without rendering it liquid; in the second, the solid is much exceeded by the quantity of fluid, which liquefies it, and imposes its peculiar form upon the compound. The products of the first state are denominated *hydrates:* the second constitute *solutions.*

I. TABLE *of Hydrates, or compounds of solid bodies and water, still retaining the solid form.*

1. *Sulphur* is found native in the state of a hydrate; but the hydrate most generally known is precipitated sulphur. (Part iii. p. 389.)
2. *Metallic oxides*, when in the state of hydrates, are powders possessed of very intense colour, having usually a strong taste, and being easily acted upon by acid or alkaline solutions.
3. *Earthy hydrates* are powders, as, for example, quicklime, and in some cases they are crystals.

4. *Alkaline hydrates* are what are commonly termed the crystals of alkalies.
5. *Acid hydrates* are those acids which are generally procured in a solid state, and known under the name of crystallized acids.
6. *Saline hydrates* comprehend the whole class of saline preparations, whether assuming the form of crystals, powders, or solid masses.
7. *Hydrates of hydrosulphurets* are the crystallized hydrosulphurets.
8. *Soaps* are hydrates, water being always present in them as a constituent.
9. Many animal and vegetable solids.

In the two last classes the proportion of combined water does not appear to be determinate, although this is the case with all the others.

Solution.—During solution, both bodies, or the solid and the liquid, act mutually upon one another at the same time; and the force exerted by each is equal to its mass. The action goes on at the point of contact only: hence, as far as the mass is concerned, the quantity of liquid has no effect in hastening the solution. When a solid body is plunged into a liquid, if the affinity between them be weak, the combination of the two goes on as long only as the force of the affinity is able to overcome the force of cohesion of the particles of the solid; when it stops, the compound remains solid, and is consequently a *hydrate.* But if the affinity be strong, the cohesion of the solid is gradually destroyed, and its particles, being united with those of the liquid, are dispersed equally through it, forming a *solution.* By the addition, however, of new portions of the solid, the action of the liquid is gradually weakened; and at length, being unable to overcome the cohesion of the solid, no more of it is dissolved. In this case, the sums of the force of the attraction of affinity exerted between the solid and the liquid, and of the force of the cohesive attraction of the particles of the solid for each other, are balanced; and the liquid is said to be *saturated.* The union of the two bodies is accompanied by the usual phenomena of chymical combination. If a portion of the liquid be now abstracted (as, for example, by evaporation), the force of the cohesive attraction of the particles of the solid becomes again superior to the force of the affinity which separates them, so that the solid is reproduced. When this is slowly accomplished, it produces crystallization, the phenomena of which have been already noticed.

In the formation of hydrates the increase of density is often very great, and much caloric is evolved. Thus, hydrate of lime is specifically heavier than pure lime. Hydrate of alum, which is simply crystallized alum, has a specific gravity of 1·7065; but when its water is driven off by calcination, the gravity is reduced to 0·4229; and crystallized nitrate of potash, or hydrate of nitre, is of the specific gravity 1·9639; but nitre deprived of water is only 1·7269.

The density of solutions is greater than the mean, when pure solids are employed; but when the hydrates are dissolved, the specific gravity is more generally less than the mean. The following useful tables drawn up by Hassenfratz, show the specific gravity of saline solutions containing different proportions of salt, at 55°.[1] By consulting them, we can readily know the exact quantity of salt contained in any saline solution, of a specific gravity corresponding with the numbers marked in the tables; and when the gravity of the solution is not found in the tables, its saline contents can still be found by calculation.

TABLE OF SALINE SOLUTIONS.

Weight of Salt in 100 parts of the Solution.	Sulphate of Soda.	Sulphate of Potash.	Alum.	Weight of Salt in 100 parts of the Solution.	Sulphate of Magnesia.	Sulphate of Iron.	Sulphate of Zinc.	Sulphate of Copper.
1	1·0039	1·0086	1·0047	2	1·0096	1·0096	1·0080	1·0141
2	1·0078	1·0171	1·0094	4	1·0192	1·0203	1·0165	1·0280
3	1·0116	1·0257	1·0142	6	1·0286	1·0314	1·0255	1·0413
4	1·0154	1·0343	1·0189	8	1·0379	1·0436	1·0345	1·0539
5	1·0192	1·0429	1·0236	10	1·0470	1·0560	1·0440	1·0660
6	1·0230	1·0515		12	1·0555	1·0696	1·0540	1·0795
7	1·0268			14	1·0646	1·0829	1·0665	1·0938
8	1·0306			16	1·0711	1·0961	1·0790	1·1083
9	1·0344			18	1·0771	1·1095	1·0915	1·1230
10	1·0381			20	1·0860	1·1220	1·1040	1·1380
11	1·0418			22	1·0976	1·1358	1·1165	1·1513
12	1·0455			24	1·1092	1·1498	1·1290	1·1747
13	1·0492			26	1·1178	1·1638	1·1420	
14	1·0528			28	1·1324	1·1781	1·1550	
15	1·0564			30	1·1440	1·1920	1·1680	
16	1·0598			32	1·1557	1·2031	1·1820	
				34	1·1675	—	1·1960	
				36	1·1789	—	1·2100	
				38	1·1905	—	1·2240	
				40	1·2122	—	1·2380	
				42	1·2262	—	1·2525	
				44	1·2302	—	1·2680	
				46	1·2432	—	1·2855	
				48	1·2562	—	1·3045	
				50	1·2683	—	1·3310	
				52	1·2833	—	1·3485	
				54	1·2973	—	1·3565	

[1] The salts were generally in a crystallized state. The column belonging to each salt terminates at the point of saturation at the temperature of 55°.

TABLE OF SALINE SOLUTIONS—*continued.*

Weight of Salt in 100 parts of the Solution.	Muriate of Soda.	Muriate of Potash.	Hyper-oxymuriate of Potash.	Muriate of Ammonia.	Muriate of Barytes.	Weight of Salt in 100 parts of the Solution.	Muriate of Magnesia.	Muriate of Lime.
1	1·0064	1·0047	1·0055	1·0029	1·0073	2	1·0068	1·0125
2	1·0128	1·0095	1·0105	1·0059	1·0146	4	1·0136	1·0212
3	1·0192	1·0143	1·0150	1·0089	1·0217	6	1·0204	1·0319
4	1·0256	1·0192	1·0193	1·0118	1·0289	8	1·0274	1·0429
5	1·0320	1·0240	1·0230	1·0149	1·0360	10	1·0340	1·0540
6	1·0384	1·0238	1·0301	1·0179	1·0430	12	1·0408	1·0650
7	1·0448	1·0388	1·0376	1·0209	1·0503	14	1·0476	1·0759
8	1·0502	1·0388	1·0461	1·0239	1·0575	16	1·0554	1·0870
9	1·0576	1·0438	1·0567	1·0269	1·0647	18	1·0612	1·0979
10	1·0640	1·0490	—	1·0300	1·0720	20	1·0681	1·1000
12	1·0775	1·0612	—	1·0358	1·0919	22	1·0751	1·1212
14	1·0910	1·0701	—	1·0416	1·1014	24	1·0823	1·1323
16	1·1045	1·0801	—	1·0474	1·1309	26	1·0895	1·1445
18	1·1182	1·0901	—	1·0532	1·1504	28	1·0967	1·1547
20	1·1320	1·1000	—	1·0590	1·1700	30	1·1040	1·1670
22	1·1462	1·1090	—	1·0642	1·1901	32	1·1114	1·1803
24	1·1608	1·1178	—	1·0693	1·2227	34	1·1190	1·1935
26	1·1760	1·1264	—	—	1·2363	36	1·1266	1·2067
28	1·1920	1·1344	—	—	1·2600	38	1·1343	1·2198
30	1·2100	1·1420				40	1·1420	1·2330
						42	1·1507	1·2478
						44	1·1597	1·2528
						46	1·1686	1·2789
						48	1·1777	1·2949
						50	1·1870	1·3120
						52	1·1963	1·3310
						54	1·2068	
						56	1·2164	
						58	1·2261	
						60	1·2380	
						62	1·2507	
						64	1·2646	

TABLE OF SALINE SOLUTIONS—*continued.*

Weight of Salt in 100 parts of the Solution.	Nitrate of Potash.	Acetate of Lead.	Acetate of Iron.	Tartrate of Soda.	Tartrate of Potash.	Phosphate of Soda.	Borax.	Soda of Commerce.	American Potash.
1	1·0063	1·0070	1·0035	1·0034	1·0050	1·0040	1·0040	1·0042	1·0050
2	1·0125	1·0140	1·0075	1·0072	1·0102	1·0081	1·0084	1·0086	1·0102
3	1·0186	1·0211	1·0112	1·0108	1·0153	1·0120	1·0122	1·0130	1·0156
4	1·0244	1·0283	1·0150	1·0148	1·0212	1·0166	—	1·0175	1·0212
5	1·0302	1·0366	1·0188	1·0190	1·0258	1·0200	—	1·0220	1·0269
6	1·0353	1·0430	1·0225	1·0231	1·0311	1·0237	—	1·0264	1·0327
7	1·0408	1·0505	1·0264	1·0272	1·0363	1·0270	—	1·0310	1·0385
8	1·0468	1·0580	1·0302	1·0313	1·0417	1·0300	—	1·0356	1·0443
9	1·0531	1·0655	1·0341	1·0355	1·0470	—	—	1·0403	1·0503
10	1·0595	1·0731	1·0380	1·0397	1·0525	—	—	1·0458	1·0563
12	1·0722	1·0891	1·0458	1·0481	1·0634	—	—	1·0544	1·0684
14	1·0850	1·1055	1·0537	1·0567	1·0744	—	—	1·0640	1·0807
16	1·0984	1·1221	1·0616	1·0655	1·0856	—	—	1·0736	1·0930
18	1·1119	1·1330	1·0697	1·0745	1·0968	—	—	1·0833	1·1053
20	1·1235	1·1560	1·0780	1·0837	1·1080	—	—	1·0930	1·1179
22	1·1389	1·1740	1·0863	1·1032	1·1196	—	—	1·1031	1·1307
24	1·1520	1·1928	1·0948	1·1153	1·1317	—	—	1·1135	1·1438
26	—	—	1·1045	1·1283	1·1447	—	—	1·1241	1·1571
28	—	—	1·1140	1·1436	1·1569	—	—	1·1349	1·1724
30	—	—	1·1224	1·1600	1·1700	—	—	1·1460	1·1840
32	—	—	1·1323	1·1801	1·1838	—	—	—	1·1989
34	—	—	—	—	1·1978	—	—	—	1·2142
36	—	—	—	—	1·2118	—	—	—	1·2304
38	—	—	—	—	1·2259	—	—	—	1·2478
40	—	—	—	—	1·2400	—	—	—	1·2660
42	—	—	—	—	1·2547	—	—	—	1·2882
44	—	—	—	—	1·2696				
46	—	—	—	—	1·2861				
48	—	—	—	—	1·3015				
50	—	—	—	—	1·3180				
52	—	—	—	—	1·3351				
54	—	—	—	—	1·3527				
56	—	—	—	—	1·3707				
58	—	—	—	—	1·3902				
60	—	—	—	—	1·4120				

It is necessary to keep in view, that the solvent powers of water are augmented by an increase of temperature, and that the proportions in the foregoing tables are such as take place only at a temperature of 55°.

If a new substance be added to the saturated aqueous solution of another substance, the result is different, according to the nature of the matters employed. Sometimes the second substance is not dissolved: thus, a saturated solution of muriate of lime at 60° cannot dissolve any common salt. Sometimes the whole, or a part of the new solid, is dissolved, without any of the already-dissolved solid being lost or precipitated: thus a saturated solution of nitrate of potassa at 51° can dissolve more chloride of sodium than can be dissolved by pure water, and the same is the case with nitrate of soda; but, in the latter case, a great portion of the nitrate is precipitated. Sometimes the new solid is dissolved at the expense of the whole of the substance already dissolved, which is consequently precipitated: thus, if a sufficient quantity of chloride of sodium be added to a saturated solution of muriate of ammonia at 61°, the former salt is dissolved, but the whole of the latter precipitates during its solution. The last result, however, does not take place at every degree of temperature; for, at a boiling heat, chloride of sodium is separated by those very salts which it precipitates at a low temperature.

b. Alcohol acts less extensively upon solids than water; and it forms no solid combinations similar to the hydrates.

Table of the pharmaceutical solids which alcohol is capable of dissolving.

1. Sulphur.
2. Phosphorus, and its compounds.
3. Fixed alkalies.
4. Some of the alkaline earths in minute proportions.
5. Most of the solid acids.
6. The vegetable alkaloids.
7. Piperina.
8. Many salts.
9. Alkaline sulphurets.
10. Alkaline soaps.
11. Tannin.
12. Resins.
13. Guaiacum.

A mixture of water and alcohol appears to possess greater energy as a solvent, in many cases, than is possessed by either of them in a separate state.

c. The action of ether upon solids is still more limited than that of alcohol. It dissolves volatile oils, resins, and some vegetable alkalies.

d. The actions of *petroleum*, *volatile oils* and fixed oils, have been too little investigated to permit any general deduction.

e. The action of mercury as a liquid is altogether confined to the metals, for many of which it has a considerable affinity, and forms compounds with them, which are denominated *amalgams.* None of these are objects of pharmacy.

III. GASES.

GASES are aëriform fluids, possessed of very different properties, but all agreeing in that peculiar kind of elasticity which constitutes aëriform bodies.

1. CONSTITUTION OF GASES.

The particles of *gases*, like those of liquids, are movable upon each other; but gases differ from liquids in possessing elasticity, or that power which allows them to be compressed into a smaller bulk; and by which, however large a portion of any gas contained in a vessel be taken away, the small portion which is left is enabled to expand so as to fill the vessel. The bulk of common air may be thus easily reduced or increased 3000 times; and, indeed, there does not appear to be any limit to expansion. These properties of airs depend on the repulsion which exists between their component particles: the force of which, according to Newton, is always inversely as the distance of their centres from each other. As gases contain a larger proportion of combined caloric than any other class of bodies, it is very probable that caloric is the cause of the repulsion which exists between their particles, or of their elasticity; and hence the addition of sensible heat to gases increases their elasticity, while the abstraction of it, or the application of cold, diminishes it. No degree of compression yet attained, nor any abstraction of caloric, can alter the constitution of air; but by compression several of the gases may be reduced to liquids, and by the simple abstraction of caloric all the vapours can be reduced to the liquid, or even the solid state.

Arrangement of pharmaceutical gases according to their composition.[1]

I. SIMPLE GASES.

1. Oxygen.
2. Hydrogen.
3. Nitrogen.
4. Chlorine.
5. Sulphur vapour.
6. Iodine vapour.

II. COMPOUND GASES.

a. Simple gases combined.

7. Hydriodic acid.
8. Binoxide of nitrogen.
9. Muriatic acid gas.
10. Ammonia.
11. Steam.

b. Oxygen and a solid base.

12. Carbonic acid gas.
13. Sulphurous acid gas.
14. Sulphuric acid vapour.

c. Hydrogen and a solid base.

15. Cyanogen.
16. Olefiant gas.
17. Sulphureted hydrogen.

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[1] *Thomson's Chymistry*, 4th edit. iii. 437.

d. Fluorine, Chlorine, Cyanogen, with a base.
18. Hydrocyanic (*Prussic*) acid.

e. Triple or quadruple compound gases.

19. Sulphuric ether.
20. Nitrous ether.
21. Vapour of alcohol.
22. ——— oil of turpentine.

All these gases are invisible, except chlorine, which has a yellowish green colour; but when gases of very different specific gravity are mixed together, they become in a certain degree visible. With respect to the specific gravity of gases, there is a greater difference between them under the same pressure, and at an equal temperature than exists between liquid substances; a circumstance which must depend either on a difference of the repulsive force, or of the weight of the atoms in different gases.

A Table of the density and weight of 100 *cubic inches of the pharmaceutical gases at the temperature of* 60°, *and a barometrical pressure of* 30°.

——	Specific Gravity.	Weight of 100 cubic inches.
Air - - - - -	1·000	30·5
Oxygen - - - -	1·111	33·888
Hydrogen - - - -	0·0694	2·117
Nitrogen - - - -	0·9722	29·652
Chlorine - - - - -	2·500	76·250
Sulphur vapour - - - -	1·111	33·888
Vapour of iodine - - -	8·678	264·679
Hydriodic acid - - - -	4·375	133·434
Binoxide of nitrogen - -	1·0416	31·769
Muriatic acid - - -	1·284	39·162
Sulphureted hydrogen - -	1·180	35·890
Steam - - - -	0·625	19·062
Ammonia - - - -	0·590	18·000
Carbonic acid - - - -	1·527	46·373
Sulphurous acid - - -	2·222	67·771
Sulphuric acid - - - -	2·777	84·698
Cyanogen - - - -	1·804	55·028
Hydrocyanic acid vapour - -	0·9368	28·572
Sulphuric ether vapour - -	2·586	78·873
Alcohol vapour - - -	1·6133	49·206
Oil of turpentine vapour - -	5·013	152·896

Water is a constituent of almost every gaseous body; and the quantity of it contained in each depends upon the bulk, not the density, of the gas. It also appears probable, that the weight of it contained in 100 inches of all gases under the same pressure, and at the same temperature, is very nearly the same. It can be separated, in a great degree, by sulphuric acid, very dry alkalies, lime, and other matters which have a powerful attraction for water; but the whole of the moisture cannot be absorbed by these substances; and it is therefore undetermined whether gases can exist independent of the presence of water. The quantity present in any gas is regulated, in a great degree, by the temperature: for, if this be high, a much larger proportion of moisture can be retained in the elastic form; but in a low temperature it is deposited.

Vapours differ from gases in several particulars. Their "elasticity does not increase as the pressure, like that of gases:" they can be condensed by pressure, and by the abstraction of caloric, into liquids; and even some of those bodies which are regarded as real gases, such as ammonia and chlorine, are reduced by pressure at a low temperature to the liquid form. The elasticity of the majority of vapours is sensible at a high temperature only; but some become sensibly elastic at the common temperature.

1. OF THE MIXTURE OF GASES WITH GASES.

1. Gases may be mixed together in the same manner as liquids, and with nearly similar results. Some never intimately combine, or are merely mechanically mingled, while others unite closely, and form new chymical compounds, possessing properties very different from those of their components.

TABLE *of pharmaceutical gases which may be mixed together without any apparent change in their state.*

i. Gases that may be mixed, but which do not combine:

Oxygen with carbonic acid gas.
Hydrogen with muriatic acid, olefiant gas, sulphureted hydrogen, and ammoniacal gas.
Nitrogen with almost all the other gases.

ii. Pharmaceutical gases which mix without any change, but may be made to combine:

Oxygen with chlorine, hydrogen, nitrogen, carbonic oxide, sulphurous acid, and protoxide of nitrogen.
Hydrogen with iodine and nitrogen.

iii. Pharmaceutical gases which mix without change, but may be made to decompose each other:

Oxygen with carbureted hydrogen, sulphureted hydrogen, cyanogen, and ammonia.

Hydrogen with carbonic acid, nitrous gas, nitrous oxide, and sulphurous acid.

Although these gases, when simply mixed, do not chymically combine, or act on each other, yet the mixtures, even independent of agitation, are homogeneous compounds, or the gases do not arrange themselves according to their gravities, but are all equally diffused in the mixture, every portion of it containing exactly the same proportion of each of the mixed gases, and when once mixed they never afterwards separate. The bulk, also, after mixture, is exactly equal to the sum of the bulks of the gases which have been mixed; or each gas occupies the same space as when separate; and the specific gravity of the mixture is exactly the mean of that of the gases mixed. Hence the mixture of these gases appears to be a species of combination, similar to that which takes place in mixing together vinegar and water, or similar liquids; and that this is actually the case appears from the experiments of Mr. Dalton[1], who found that two gases of different specific gravity, when merely brought into contact, the lightest being placed uppermost and the heaviest undermost, will mix together spontaneously, if left at rest; and the same effect will take place if the gases be put in separate vessels, communicating with each other by a tube only, as in the experiments of M. Berthollet[2], who supposes that the gases dissolve one another, while Mr. Dalton conceives that they are merely mechanically combined.

Vapours and gases unite in nearly the same manner as gases and gases; and this combination enables the vapour to sustain the pressure of the incumbent atmosphere, which it could not otherwise support without being condensed. They are also retained together by a species of affinity, sufficient to cause their intimate and uniform mixture, but not strong enough to produce chymical combination.

2. Of the gaseous bodies which chymically unite when they are mixed, " some combine in all circumstances, by mere mixture; others unite only in particular states."

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[1] *Phil. Mag.* xxiv. 8.

[2] *Statique Chymique*, i. 274. 487.

TABLE *of some of the gases which unite by simple mixture, and form pharmaceutical products.*

Names and proportions of the gases.	Volumes.		*Products.*
Oxygen	100 + 133	Binoxide of nitrogen	Nitric acid.
	100 + 200		Nitrous acid.
Ammoniacal gas with vapour			Liquid ammonia.
————	100 + 100	muriatic acid gas	Muriate of ammonia.
————	100 + 100	carbonic acid ...	Carbonate of ammonia.
————	100 + 100	sulphureted hydrogen.........	Hydrosulphuret of ammonia.

The two first of these products are vapours, the third is a liquid, and the rest are solid bodies.

a. Oxygen and binoxide of nitrogen unite in two different proportions; or 100 volumes of oxygen gas are capable of uniting with 133, and also with 200 volumes of binoxide of nitrogen. The first proportions produce nitric acid, which, as binoxide is a compound of $66\frac{2}{3}$ volumes of nitrogen, and $66\frac{2}{3}$ of oxygen, therefore appears to be a compound of $166\frac{2}{3}$ volumes of oxygen combined with $66\frac{2}{3}$ of nitrogen; the second produce nitrous acid, which appears on the same principles to be a compound of 100 volumes of oxygen united to 200 of nitrogen. It is, however, probable that these gases will combine in different proportions from the above, and produce nitric acid, containing various proportions of nitrous gas in solution. The immediate effect of their combination is the formation of a yellow-coloured vapour.

b. Ammoniacal gas and *aqueous vapour* combine the moment they are brought into contact; and are condensed to a liquid; but the exact proportions are unknown.

c. Ammoniacal gas and *muriatic acid gas* unite when equal volumes of each are brought into contact; and the result of the mixture is a mutual condensation into a white powder, or muriate of ammonia. If 100 cubic inches of muriatic acid gas, therefore, weigh 59·80, and the same bulk of ammoniacal gas 18·67 grains troy, muriate of ammonia must be a compound of three parts of muriatic acid by weight, united to 1 part of ammonia, or of 1 proportion of each.

d. Ammoniacal gas and *carbonic acid* unite in equal volumes, and condense into a solid salt, which is carbonate of ammonia.

e. The combination of *ammoniacal gas* with sulphureted hydrogen in equal volumes forms also a solid compound.

TABLE *of some of the gases which mix without chymically combining, but may be made to combine; and of the pharmaceutical products formed by the combinations.*

Names and proportions of the gases.			*Products.*
Oxygen	100 + 200	hydrogen	Water.
———	50 + 100	carbonic oxide .	Carbonic acid.
———	250 + 100	nitrogen	Nitric acid.
———	250 + 100	chlorine	Chloric acid.
———	50 + 100	sulphurous acid	Sulphuric acid.
———	200 + 100	protoxide of nitrogen	Nitric acid.
Hydrogen	100 + 100	chlorine	Muriatic acid.
Hydrogen	100 + 100	cyanogen......	Hydrocyanic acid.
Hydrogen	100 + 100	iodine	Hydriodic acid.

a. The two first combinations may be effected by combustion, and the third by electricity. It has been supposed that the heat in these cases acts indirectly only, and produces the combination by forcibly expanding one portion of the gas, and thence producing a sudden compression in the neighbouring portions, so that some of the atoms of the two gases, being brought within the sphere of action of the attraction of affinity, combine; while the caloric evolved by this union occasioning the same expansion to be constantly renewed, the whole gaseous mixture is by degrees combined. This theory is confirmed by the experiments of Biet, which proved that oxygen and hydrogen gases can be made to combine by simple pressure.

b. Oxygen gas and *sulphurous acid gas* probably combine when simply mixed together, but the fact has not been ascertained in a decisive manner. They undoubtedly combine in a red heat; it is, however, probable that the combination is not direct, but that a portion of the sulphur is first separated, and then enters into combustion.

All these gases suffer condensation when they combine, as displayed in the following table[1]:

[1] This Table is copied from that drawn up by Dr. Thomson (*Syst. of Chymistry*, 5th edit. iii. 47.)

Constituents.	Volumes of ditto.	Products.	Volumes of Products.	Volumes condensed.
Hydrogen - - Oxygen - -	1 2	Water	2	1
Oxygen - - - Carbon - -	1 2	Carbonic acid	2	1
Oxygen - - Nitrogen -	2·5 1	Nitric acid	1?	2·5?
Oxygen - - Sulphurous acid -	1 2	Sulphuric acid	1·2	1·8
Oxygen - - Protoxide of nitrogen	2 1	Nitric acid	1?	2?
Hydrogen - - Chlorine - -	1 1	Muriatic acid	2	0
Hydrogen - - Iodine - -	1 1	Hydriodic acid	2	0
Hydrogen - - Cyanogen - -	1 1	Hydrocyanic acid	2	0

TABLE *of the principal pharmaceutical gases which mutually decompose each other when mixed together.*

Chlorine - -	with	Ammonia.
——— - -	—	Sulphureted hydrogen.
——— - -	—	Nitrous gas.
Sulphureted hydrogen	—	Nitrous gas.
———————	—	Sulphurous acid.

The first decomposition is attended with combustion.

a. Chlorine and *ammonia*, when brought into contact, excite spontaneous combustion; one fourth of the ammonia is decomposed; the hydrogen of that portion uniting with the chlorine, and forming muriatic acid, which enters into combination with the remaining ammonia, forming the muriate, whilst the nitrogen is dissipated.

b. Chlorine with sulphureted hydrogen is also formed into muriatic acid, whilst the sulphur is precipitated.

c. *Chlorine* with nitrous gas has no reciprocal action: it is brought to the state of common muriatic acid; while the nitrous gas is converted into nitric acid. The requisite proportions, according to Humboldt[1], are equal bulks of each gas.

d. *Sulphureted hydrogen gas* and *nitrous gas* mixed together in a dry state suffer spontaneous decomposition; sulphur is deposited, and protoxide of nitrogen, ammonia, and water, are produced.

TABLE *of some gases which mix without spontaneous decomposition, but which may be made to decompose each other by peculiar treatment.*

Oxygen	- with	Sulphureted hydrogen.
———	- —	Vapour of ether.
———	- —	——— alcohol.
Nitrous oxide	—	Hydrogen.
———	—	Sulphureted hydrogen.
———	—	Vapour of ether.
———	—	——— alcohol.
Nitric acid	- —	Hydrogen, and probably all the preceding combustible gases and vapours.
———	- —	Sulphurous acid.
Nitrous gas	- —	Hydrogen.
———	- —	Sulphurous acid.
Hydrogen	- —	Sulphurous acid.
———	- —	Carbonic acid.

Some of these decompositions are rapidly produced by combustion; others take place without combustion, and are, consequently, very slow.

Oxygen and *sulphureted hydrogen gases*, when mixed together, do not suffer any change; "but, if the mixture be made to approach an ignited body, combustion immediately takes place, and the products vary according to the proportion of the gases mixed." In all cases a great proportion of the sulphur is deposited, and some sulphurous acid is formed, owing to the caloric evolved by the combustion of the hydrogen setting fire to a portion of the sulphur.

The *vapours of ether* and of *alcohol* detonate when certain proportions are mixed with common air, or rather with the oxygen it contains; and the products are carbonic acid and water; the quantity of the former being very considerable,

[1] *Ann. de Chymie*, tom. xxviii. p. 142.

when the vapour fired is that of alcohol. If the proportion of the ethereal vapour be one cubic inch, which should weigh 0·7 grains, and that of the oxygen 6·8 inches, weighing 2·3 grains, the products will be 4·6 inches of carbonic acid, and a portion of water.

The following TABLE *shows the quantity of oxygen necessary for decomposing* 100 *inches of each of the above gases.*

100 measures of	Measures of oxygen.
Sulphureted hydrogen - -	75
Vapour of ether - -	680
——— alcohol - - -	680 [1]

When 100 measures of *nitrous oxide* are mixed with 100 of *hydrogen*, and fired by the electric spark, a complete combustion of the hydrogen and decomposition of the nitrous oxide take place, and water and nitrogen are produced. The superior affinity of the hydrogen over nitrogen is, in this case, aided by the caloric which is evolved during the combustion of the former gas.

Nitrous gas does not detonate with, nor decompose, any of the combustible gases which have been just considered; but when moist iron is placed in contact with nitrous gas, the hydrogen evolved by the decomposition of the water for the oxidizement of the iron decomposes the nitrous gas, converting it into nitrous oxide, and forming ammonia.

The other cases of decomposition enumerated in the table are slowly produced by the continued action of electricity, without any combustion taking place.

The combinations of gases with gases are not immediately effected for the purposes of pharmacy, but several of them occur during many of the operations for the preparation of the saline and metallic compounds; and, therefore, require to be known and understood for comprehending the theory of these operations.

2. OF THE COMBINATION OF GASES WITH LIQUIDS.

Water is the only liquid the action of which upon the gases has been accurately examined. In its ordinary state it contains in solution a considerable portion of atmospheric air, which can be separated from it by boiling; and it is then capable of re-absorbing air, and any other gaseous fluid with

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[1] *Thomson's Chymistry,* 4th edit. iii. 469.

which it may come in contact. All gases, however, are not equally absorbable; some being taken up in great quantity, and others only in a very small proportion.

TABLE *of pharmaceutical gases which are but little absorbable by water, placed in the order of their absorption, beginning with the least absorbable.*

1. Nitrogen gas.
2. Hydrogen gas.
3. Arsenical hydrogen.
4. Carbureted hydrogen.
5. Oxygen gas.
6. Nitrous gas.
7. Olefiant gas.

The quantity of any gas absorbed by water is very much increased by pressure; but by diminishing pressure, the gas again separates in its elastic form. Temperature also regulates the quantity, which diminishes as the temperature increases, owing to every additional increment of caloric augmenting the elasticity of the aëriform fluid. Thus Dr. Henry found that 100 inches of water at 55° absorb 108 inches of carbonic acid, while at 85° they absorb only 84 inches.

When water is pure, and the pressure and the temperature are equal, it then "absorbs a determinate quantity of every individual gas."

TABLE, *exhibiting the bulk of several gases, absorbed by* 100 *cubic inches of water at* 60°, *according to the experiments of Mr. Dalton, Dr. Henry, and M. Saussure.*[1]

Names of gases.	Bulk absorbed by 100 cubic inches of water, according to		
	DALTON.	HENRY.	SAUSSURE.
Carbonic acid - -	100	108	106
Sulphureted hydrogen	100	106	253
Nitrous oxide - -	100	86	76
Olefiant gas - -	12·5	—	15·3
Nitrous gas - -	3·7	5·	—
Oxygen gas - -	3·7	3·7	6·5
Phosphureted hydrogen	—	2·14	—
Carbureted hydrogen -	3·7	1·4	5·1
Azotic gas - -	1·56	1·53	4·1
Hydrogen - -	1·56	1·61	4·6
Carbonic oxide -	1·56	2·01	6·2

[1] *Thomson's Chymistry,* 5th edit. iii. 58.

From this table it appears that water absorbs its own bulk, or rather more, of the first three gases; one eighth of its bulk of the fourth; one twenty-seventh of the fifth, sixth, and seventh; and one sixty-fourth of the last three; and the absorption is in the direct ratio of the densities of the gases.

With regard to pressure, water of the same temperature always takes up the *same bulk* of each gas, whatever be the density of the gas; and, therefore, by increasing the pressure sufficiently, water may be made to absorb any quantity of gas. Thus twice its bulk of carbonic acid will be absorbed under an additional pressure of 30 inches of mercury; three times its bulk under a pressure of 60 inches, and so on:—a fact which has been applied to practice, in the manufacture of aërated soda water, on a great scale. From this circumstance it would appear that the absorbed gas still retains its elasticity; yet it is probable that a chymical attraction is exerted between the particles of the water and those of the gas, and it is taken up until the repulsion between the particles of the absorbed gas just balances the affinity of the water for them. Owing, however, to the weak affinity exerted between the gas and the water, if a quantity of water fully impregnated with any gas, as carbonic acid, for example, be exposed to the atmosphere, or any other gaseous body, the greater part of the absorbed gas escapes from the water and mixes with the superincumbent air; and, therefore, to preserve the impregnation complete, the aërated water must be preserved in well-stopped bottles, or under an atmosphere of the same gas it contains.

Such are the principal circumstances connected with the absorption of the less absorbable gases; those which are more absorbable appear to belong to the class of *acids* and *alkalies.*

TABLE *of the very absorbable gases, with the numbers of measures of each absorbed by one measure of pure water*[1]*; and the increase of bulk produced on the fluid, supposing the original bulk to be* 1.

Names of gases.	Measures absorbed.	Bulk in cubic inches.
Chlorine	2	1·002
Cyanogen	4½	——
Sulphuric acid	43·78	1·040
Muriatic acid	516	1·500
Fluoboric acid	700	——
Ammoniacal	780	1·666

[1] *Thomson's Chymistry,* 5th edit. iii. 68.

The absorption of these gases is the consequence of the exertion of an affinity between them and water; but, in every respect, the circumstances attending it are exactly the same as those attending the absorption of the former class of gases; except that "most of the gases belonging to the first class experience an expansion when absorbed; while all those of the second undergo a condensation, their affinity for water being greater than their elasticity."

With regard to the absorption of gases by other liquids, scarcely any very decisive experiments have been made; but the experiments of Saussure render it probable that alcohol and oil absorb a much greater proportion than water.

3. OF THE COMBINATION OF GASES WITH SOLIDS.

From the difference which exists between the constitution of gases and solids, their combination appears to be opposed by the elasticity of the former and the cohesion of the latter; but, nevertheless, under proper circumstances, both the simple and the compound gases combine with solids.

The simple gases are *oxygen*, *chlorine*, *hydrogen*, *nitrogen*. Of these, oxygen combines with all the known simple solids; which are *carbon*, *boron*, *silicon*, *phosphorus*, *sulphur*, *selenium*, *iodine*, *bromine*, and the *metals;* hydrogen requires that the solids be brought into a fluid state before it can combine with them; and nitrogen combines with one solid only, which is carbon.

a. Oxygen gas unites with carbon in two proportions, and forms *carbonic acid*, and *carbonic oxide*, which are gaseous fluids. Experiment has demonstrated that carbonic acid is composed of 27·27 parts of carbon and 72·73 of oxygen: thence, an atom of it must consist of two atoms of oxygen $(8 \times 2) = 16$, and one of carbon $= 6·12$, making the equivalent $= 22·12$. *Carbonic oxide* is composed of 41 parts by weight of oxygen and 28 of carbon; or of one atom of oxygen $= 8$, and one of carbon $= 6·12$, making the equivalent $= 14·12$. Oxygen combines with boron in one proportion only, forming boracic acid, which is a compound of one atom of boron $= 10·9$, and three atoms of oxygen $(8 \times 3) = 24$, the equivalent being $= 34·9$; or 100 parts of boron and 228·57 of oxygen.

With phosphorus, oxygen unites in three proportions, and forms *hypophosphorous acid*, *phosphorous acid*, and *phosphoric acid*, which are all solid substances. The proportions of the constituents of the two last compounds are the following: phosphorous acid consists of two atoms of phosphorus $= 31·4$ and three of oxygen $(8 \times 3) = 24$, making the equivalent

=55·4: and phosphoric acid of two atoms of phosphorus =31·4, and five of oxygen $(8 \times 5) = 40$; thus affording an equivalent of = 71·4.

Oxygen combines with sulphur in the same manner, and forms *hyposulphurous acid, sulphurous acid,* and *sulphuric acid;* the first of which is supposed to be a solid, the second and third are gases. The constituents of hyposulphurous acid are two atoms of sulphur = 32·2, and two of oxygen = 16, making its equivalent number = 48·2; those of sulphurous acid are, one of sulphur = 16·1, and two of oxygen = 16, making its equivalent = 32·1, while sulphuric acid is formed by the union of one atom of sulphur = 16·1, to three atoms of oxygen = 24, making its equivalent = 40·1. The oxygen in these compounds is much more loosely combined than in the preceding; and thence the greater facility with which they are decomposed by combustibles.

Oxygen unites readily with the *metals,* forming solid compounds. In them the oxygen is condensed, while the cohesion of the metallic particles is merely weakened, but not overcome. It has been supposed that the metals combine with determinate proportions only of oxygen, that there are no intermediate combinations, and that, in general, there are only one and two degrees of metallic oxidizement; there are, however, some which unite with three proportions. The compounds formed by the combination of oxygen with the metals have a powerful action on the animal economy, and are consequently very important objects of pharmacy. In this state metals become, also, capable of combining with acids, and acquire still greater activity; and, as the degree of oxidizement varies, so the combination of the oxide in these different states with the same acid forms compounds differing from one another, and exerting various degrees of medicinal power.

b. Chlorine unites with all the metals, forming solid compounds, some of which are active remedial agents.

c. Hydrogen has a considerable affinity for the simple combustibles; but they do not combine unless the cohesive force, which keeps together the particles of the solid, be overcome, or the hydrogen be exhibited in a nascent state; and, therefore, it is chiefly by the decomposition of water that these combinations are effected. Owing to the great elasticity of hydrogen gas, all the known combinations of it with the simple combustibles, except one, are gases.

Hydrogen unites with *carbon* in four proportions, constituting, 1. *olefiant gas,* which is composed of one atom of carbon and one of hydrogen; 2. *bihydruret,* composed of two atoms of hydrogen and one atom of carbon; 3. *bicarbureted* *hydrogen*, composed of one atom of hydrogen and two of carbon; and 4. *ether*, composed of two atoms of olefiant gas and one of water.

"Sulphureted hydrogen is the most intimate of the combinations of *sulphur* and hydrogen. A red heat does not decompose it." It is commonly formed by the "decomposition of water by the compound agency of an acid, and a metal united to sulphur." In this case no obstable is raised to the combination of the hydrogen, which is nascent, by the attraction of cohesion, the sulphur being just separated from the metal.

The combination of hydrogen with *phosphorus* is also obtained by the decomposition of water, by boiling the phosphorus in a liquid alkali, which retains the phosphorus in a temperature sufficient for enabling it to effect the decomposition. The oxygen of the water unites with one portion of the phosphorus, and forms phosphoric acid; while, at the same time, the hydrogen unites with the other portion, and forms phosphureted hydrogen.

d. The combinations of *nitrogen gas* with the simple solid combustibles are not yet sufficiently understood, except its combination with carbon to form *cyanogen*,[1] which is a compound of one atom of nitrogen and two atoms of carbon. This compound unites with combustibles, and forms new compounds; for example, *iodide of cyanogen* and *bromide of cyanogen*.

The compound gases do not enter into many combinations with solids, if the salts, which the acid gases form with alkalies, earths, and metallic oxides, be excepted, and those formed by ammonia with the solid acids. In general, they are *decomposed*. Thus, carbon, phosphorus, sulphur, and many metals decompose nitrous gas, nitric acid, and chlorine; and sulphurous acid is decomposed by the metals.

Such are the effects of the combinations of solids, liquids, and gases. The knowledge of the laws which regulate them, and the results of the combinations, are of the utmost importance; the greater number of the operations of pharmacy consisting of the combination of substances,

[1] This name was imposed upon this gaseous compound by Gay Lussac, who discovered it in 1815; and who found that, in combination with hydrogen, it forms prussic acid, which he therefore named *hydrocyanic acid*. It may be obtained from exposing dry bicyanide of mercury in a small retort to a moderate heat. It is a colourless, transparent, elastic fluid, with a strong disagreeable odour, soluble in water and alcohol, and highly inflammable, burning with a beautiful violet-coloured flame.

with a view either of obtaining compounds by their direct chymical union, or the products of chymical action resulting from their mutual decomposition.

SECTION III.

PHARMACEUTICAL OPERATIONS AND APPARATUS.

THE operations of pharmacy may be arranged under two classes:—

I. *Operations which are purely mechanical.*

II. *Operations which are performed by chymical powers and agents.*

The first are intended for determining the weight and bulk of bodies, diminishing their cohesion, and separating their integral parts: the second are intended for separating the elements of bodies from one another, and for re-uniting these elements into new combinations.

I. PHARMACEUTICAL OPERATIONS PURELY MECHANICAL.

a. *Of the means of determining the weight and bulk of bodies.*

In pharmaceutical processes it is essential that the quantities of the substances employed be accurately ascertained; and for this purpose beams with scales and measures must be provided. Several sets of beams and scales are necessary; one set for large weights, from one pound to one hundred weight or more; another for weights not exceeding five pounds; and a third for small weights under two drachms. A good beam should remain in equilibrium, both by itself, and when the scales are suspended to each extremity; the largest sets should be exact to within half a drachm; the second should be sensibly affected by two or three grains at most; and the smallest by the hundredth part of a grain. Apothecaries, however, seldom have beams of such accuracy, and, generally, those which they employ are much injured by exposure to acid fumes, and from want of cleanliness. To preserve the delicacy of beams, they should be kept in very close cases, and not left suspended longer than is absolutely necessary; nor should they be overloaded.

Drugs are bought in the gross by *avoirdupois weight*, which is the standard of most articles of merchandise; but, for the composition of medicines, *troy weight* is directed to be used by the British Colleges. The following TABLE exhibits the manner in which the pound is divided, and the signs used, in prescriptions, for denoting the different weights:—

A pound (*libra*), ℔	contains	Twelve ounces, ℥xij.
An ounce (*uncia*), ℥		Eight drachms, ʒviij.
A drachm (*drachma*), ʒ		Three scruples, ℈iij.
A scruple (*scrupulus*), ℈		Twenty grains, gr. xx.
A grain (*granum*), gr.		———

The differences between the avoirdupois pound and the troy or apothecaries' pound, and their subdivisions, are exhibited in the following TABLES:—

Troy or Apothecaries' weight.

Pound.		*Ounces.*		*Drachms.*		*Scruples.*		*Grains.*
1	=	12	=	96	=	288	=	5760
		1	=	8	=	24	=	480
				1	=	3	=	60
						1	=	20[1]

Avoirdupois weight.

Pound.		*Ounces.*		*Drachms.*		*Grains.*
1	=	16	=	256	=	7000
		1	=	16	=	487·5
				1	=	27·975

The troy weight has also been adopted by the Edinburgh College for apportioning liquids; but the London and Dublin Colleges, with more propriety, order liquids to be measured: and for this purpose the London College employs measures derived from the wine gallon, which is subdivided for medical purposes, in the manner exhibited by the following TABLE, which shows also the symbols used for denoting the several measures:—

A gallon (*congius*), C	contains	Eight pints, 0 viij.
A pint (*octarius*), 0		Sixteen fluid ounces, f ℥ xvi.
A fluid ounce (*fluid uncia*), f ℥		Eight fluid drachms, f ʒ viij.
A fluid drachm (*fluid drachma*), f ʒ		Sixty minims, ♏ lx.
A minim (*minimum*), ♏		———

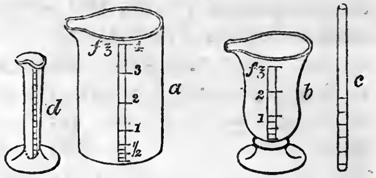
Table of the proportions of the wine gallon.

Gallon.		*Pints.*		*Fluid ounces.*		*Fluid drachms.*		*Minims.*
1	=	8	=	128	=	1024	=	61440
		1	=	16	=	128	=	7680
				1	=	8	=	480
						1	=	60

[1] Tables of the method of reducing the subdivisions of the troy pound into decimals of the troy pound are given in the Appendix to Part I.

The London College has introduced the minim measure as a substitute for the drop, the inaccuracy of which had been long experienced; as the fluidity and specific gravity of the liquid, the thickness of the lip of the phial, and even its degree of inclination, were all liable to vary the size of the drop; but by dividing the fluid drachm into sixty equal parts, a measure of bulk is obtained, which is as constant and uniform as the grain weight employed for solids.

For measuring liquids, graduated glass measures of different sizes, *a*, *b*, are to be preferred; and for quantities under five minims a slender, graduated glass tube, *c*, open at both ends, or the measure, *d*, is to be employed. When the tube is used, the graduated end is to be inserted into the liquid to be measured down to the mark indicative of the quantity required; and the upper end being then closely covered by the finger, the tube retains the proper quantity of liquid, which again drops from it on raising the finger from the upper end: the small glass measure is now pretty generally used instead of the tube. In extemporaneous prescriptions, the measures of a table-spoonful, *cochleare majus*, and a tea-spoonful, *cochleare minimum*, are used, when great accuracy is not required; the former being supposed to be equal to half a fluid ounce, the latter to a fluid drachm.



Elastic fluids or gases are also measured in glass jars, or tubes hermetically closed at one extremity, and graduated by inches, with their decimals; but, in ascertaining the bulk of gases, the temperature of the atmosphere, and its density at the time, as indicated by the thermometer and the barometer, must be attended to; for if the former be above or below 60°, the mean heat of the air, or if the mercury in the barometrical tube be under or above 30 inches, corrections must be made by calculation relative to the degrees of temperature and pressure. For the former, the observed column of air must be divided by 80, and the quotient multiplied by the degree of temperature above or below 60°. This correction is negative when the actual temperature is above the standard, and positive when it is below. For making the corrections with regard to pressure, see the table in the Appendix.

The SPECIFIC GRAVITY of bodies is also necessary to be known in many pharmaceutical processes; and as the effects of acids and alcohol depend on the degree of their concentration, a knowledge of their gravity enables this to be correctly ascertained. The specific gravity of any substance is "the quotient of its absolute weight divided by its magnitude, or the weight of a determinate bulk of any body; and as a standard for this purpose, the weight of a determinate magnitude of distilled water has been generally assumed as unity.[1] It is seldom necessary to determine the specific gravity of solids; but for ascertaining that of fluids various means may be employed. If a little ball of rock-crystal, for instance, suspended by a hair or a fine platinum wire, be weighed first in air, and afterwards in distilled water of the temperature of 60° Fahr., the weight lost by the ball is equal to the weight of an equal bulk of the liquid; so that, by repeating this operation in other fluids, and dividing its loss of weight in any other liquid by its loss of weight in water, the quotient is the specific gravity of the particular liquid. The specific gravity of liquids, however, is more generally determined by hydrometers, of which Mr. Nicholson's is by far the most accurate.[2]

The specific gravity of liquids is also very easily determined by the following simple method:—Take a small light bottle which stands firmly, *e*, and holds about a fluid ounce or two fluid ounces of water, and stop its neck by a piece of barometer-tube very accurately ground; or a conical stopper with a notch in it, *f*. First weigh the empty bottle and tube, then fill it with distilled water at 60°, recently boiled, till the water rises a little into the bore of the tube, and weigh the whole, scratching the weight in grains on the bottle, and also the weight in grains of the empty bottle, and tube. For facilitating calculation, the water should be brought to that height in the tube, at which its weight will be 500 grains or 1000, or 1500, or 2000; and this height must be accurately marked on both sides of the tube with a file. A bottle of this kind is now sold under the name of "*Thousand grain bottle*," with a weight, which is an exact counterpoise to it, when it is full of distilled water at 60°. By filling this bottle with any other fluid, and weighing it, the specific gravity of that fluid is ascertained by only calculating how much lighter or heavier it is than the same bulk of water.[3] Thus, if it be filled with sulphuric ether, instead of weighing 1000 grains, as when it is filled with water, it will require 270 grains to be put into the scale with the bottle to restore the equilibrium, and thence, its sp. gr. is 0·730: but, if sulphuric acid be used, 875 grains will be required to be added to the 1000 grains' weight in the opposite scale, and consequently its sp. gr. is 1·875.

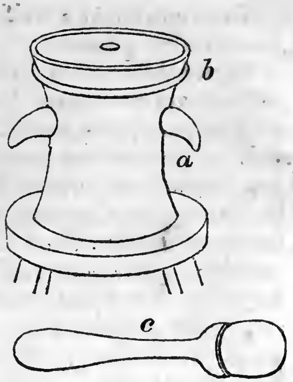
1 *Lavoisier's Elements of Chymistry.*—Trans. 376.
2 *Nicholson's Journal,* 4to; 110.
3 *Aikin's Dictionary of Chymistry,* ii.—*Appendix.*

In ascertaining specific gravity, the substances should be brought by calculation to the temperature of 60°, if the thermometer be above or below that point at the time of performing the experiments; and the gravities should always be expressed according to their relation to distilled water. Although this is the method generally employed in philosophical and pharmaceutical operations, yet it is necessary to observe, that the strength of spirits, according to the excise laws in this country, is estimated by the proportion they contain of a standard spirit, termed hydrometer proof, which consists of 40 parts of pure alcohol and 51 of water. Sikes's hydrometer is the one employed by the Excise. The strength of spirits stronger than proof, or *over proof*, is ascertained by the bulk of water required to reduce a given bulk of the spirits to the specific gravity denominated proof, on Sikes's hydrometer; and the strength of weaker spirits, or *under proof*, is estimated by the quantity of water it would be necessary to abstract to bring the spirits up to proof. Thus, if 20 gallons of the spirit require the addition of one gallon of water to bring it to proof, the spirit is said to be *one* to *twenty over proof;* and if, from the same quantity of spirits, one gallon of water must be abstracted to bring it to proof, it is said to be *one* in *twenty under proof;* and so on.

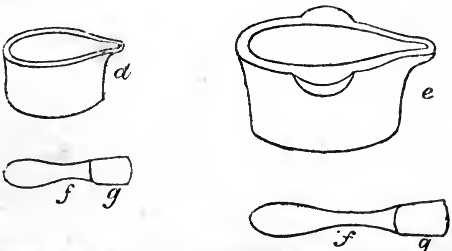
b. *Of the mechanical division of bodies.*

The cohesion of solid bodies often opposes an obstacle to their immediate chymical combination with other substances, and their medicinal action in the stomach; and therefore the following preliminary mechanical operations are instituted for overcoming to a certain degree that power, and separating the integrant particles of bodies, or reducing them to the state of powder. These are denominated pulverization, trituration, levigation, and granulation.

1. *Pulverization* is that process by which friable and brittle solid bodies are reduced to powder. It is generally performed in mortars, by means of pestles. These are made of various materials; of brass, iron, marble, granite, glass, agate, and porcelain, or of Wedgewood's ware, according to the nature of the substances for the pulverization of which they are intended to be used: it being requisite that the materials of which pestles and mortars are made be such as to resist both mechanical force and the chymical action of the substances they contain. Thus, a mixture containing any astringent matter is turned black, if rubbed in an iron mortar; and acid substances act upon one made of marble.



Mortars are required to be of various sizes. The largest size is usually made of cast iron, *a*, fitted with a wooden cover, *b*, perforated to admit the pestle, but close enough to prevent the finer and lighter parts of the substances from flying off, and to defend the operator from disagreeable and noxious matters, such as aloes, ipecacuanha, &c. This may be more completely attained by tying closely round the mouth of the mortar, and round the stalk of the pestle, *c*, a large piece of leather, so pliable as to admit the free motion of the pestle. But notwithstanding these guards, it is sometimes necessary for the operator to cover his mouth and nostrils with a wet cloth, and to stand with his back to a current of air, that the particles which arise may be carried from him, when very acrid friable matters, as Euphorbium or Spanish flies, for instance, are to be powdered. To lessen the labour, the pestle is often attached by a cord to the end of a flexible wooden beam, placed horizontally over the mortar, the elasticity of which elevates the pestle to the proper height after each stroke is made. For lighter purposes, brass and bell-metal mortars are sometimes used: but as, in the pulverization of every hard body, the mortar also is worn by the operation, these mortars are improper for pharmaceutical purposes. The most useful mortars for smaller articles are those of porcelain and Wedgewood's ware, *d*, *e*, as they are smooth, hard, and resist the action of any chymical re-agent. The handles, *f*, of the pestles are made of wood, and the heads, *g*, of the same material as the mortar.



Of whatever materials mortars are made, they should be internally, at bottom, of the form of a hollow hemisphere, and their sides should have such a degree of inclination as to make the substances fall back to the bottom every time the pestle is lifted. The operation, however, is retarded when too great a portion of the ingredients falls under the pestle; hence a large quantity of any substance should not be put into the mortar at a time, and the finer parts should be from time to time removed.

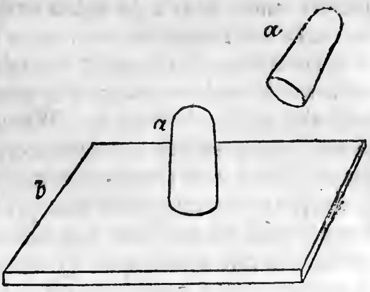
Vegetable matters require to be dried before they can be pulverized; and wood, roots, and barks should be previously cut, chipped, or rasped. When roots are very fibrous, as those of ginger, for example, it is advisable to cut them diagonally, which prevents the powder from being full of hairlike filaments. Resins and gum resins, which soften in a moderate temperature, or in warm weather, should be powdered in cold weather, and only gently beaten to prevent them from running into a paste instead of forming a powder; and when the powdered substance is intended to be dissolved in any menstruum except a pure alkali, the pulverization is much facilitated by mixing them with a portion of clean, well washed, white sand. The pulverization of camphor is assisted by the addition of a few drops of alcohol; sugar is the best addition to aromatic oily substances, as nutmegs, mace, &c.; and to the emulsive seeds some dry powder must be added, without which they cannot be reduced to powder. Metals which are scarcely brittle enough to be powdered, and yet are too soft to be filed, as zinc, for instance, "may be powdered while hot in a heated iron mortar; or metals may be rendered brittle by alloying them with a small quantity of mercury[1];" but as metals are not required to be reduced to the state of very fine powder for pharmaceutical purposes, these processes are seldom performed.

2. *Trituration* is intended to produce the same effect as pulverization, but in a greater degree. It is performed by a rotatory motion of the pestle, either in the common mortars of glass, agate, or Wedgewood's ware, or in flatter mortars made of the same materials. On a great scale this operation is performed by means of large rollers of hard stone, which turn upon each other as in corn mills, or by one vertical roller, turning upon a flat stone. The fine powders kept in the shops are generally ground in this manner; but there appears to be an error in reducing vegetable matters to the state of impalpable powder: for in this state, both during the process of grinding and afterwards, the air and light act powerfully upon them, and produce changes, which, although they be not well understood, yet appear to alter the medicinal virtues of the substances.

3. *Levigation* is a process similar to trituration, except that the rubbing is assisted by the addition of a liquid in which the solid under operation is not soluble. Water or spirit of wine is usually employed, and occasionally viscid and fatty matters,

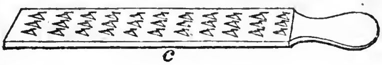
[1] *Lavoisier's Chymistry.*—Trans. 437.

as honey and lard. The substance to be levigated is spread on a flat table of porphyry, or some other hard stone, *b*, and is then bruised and rubbed with a muller of the same materials, either of a cylindrical shape, as *a*, *a*, or a portion of a large sphere. A thin spatula of ivory, horn, wood, or iron, is employed to bring back the materials from the edges of the table, to which the operation of the muller continually drives them. Earths and some metallic substances are thus prepared.



4. *Granulation* is employed only for the mechanical division of metals and of phosphorus. It is performed by melting the substance, and either stirring it briskly until it is cold, or pouring it, in the melted state, into water, and stirring or agitating it till it cool. For the granulation of phosphorus, the latter process must be employed.

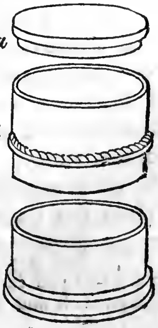
Substances are also reduced to the state of coarse powder by rasping and filing; and softer vegetable bodies are converted to a pulp by means of the grater, *c*.



MECHANICAL SEPARATION.

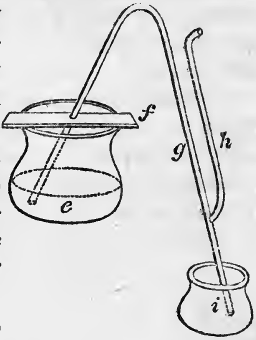
The parts of substances, under certain circumstances, may be separated from each other by different mechanical means; as sifting, washing, or elutriation, filtration, expression, and despumation.

1. *Sifting.* The particles of the powders obtained by the longest and most accurate pulverization and trituration are still of very unequal degrees of fineness, and therefore require to be separated, the finer from the coarser, by the operation denominated sifting. For this purpose sieves are employed, made of iron-wire, or of hair-cloth, or of gauze. These permit the finer particles to pass through them, and leave the coarser to be again submitted to the pestle; and thus by degrees the whole assumes an uniform fineness. The simple sieve is a broad wooden hoop, with a cloth of one or other of the above textures stretched over it in the manner of the parchment of a drum. The com-



pound sieve, which is more employed, consists of the simple sieve, *b*, with a deeper rim, *a*, a lid covered with leather, and *d*, a receiver, with leather stretched across one end, and made sufficiently wide to admit the lower portion of the sieve to enter and fit tightly within it. When these are put together, the finest powders may be separated by them without any loss or inconvenience to the operator.

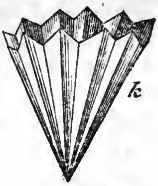
2. *Washing*, or *Elutriation*, is intended for separating the finer parts of powders prepared by trituration or levigation, which are not acted upon by water. The powdered substance is mixed with a large quantity of water, and briskly stirred, so as to diffuse it pretty equally through the fluid, which retains the finer particles suspended for a short space of time, and permits the coarser to settle to the bottom. The liquor, still containing the finer particles suspended, is poured off from the sediment; and by allowing it to remain at rest for a sufficient length of time, it deposits the fine powder, from which the clear water is separated, either by carefully decanting it, or, if the sediment be very light, so as to be easily disturbed, by drawing it off through the glass syphon, *g*, the longer limb of which being plunged into the vessel containing the fluid till it nearly touches the subsided powder, where it is supported by the board, *f*, placed on the mouth of the vessel, *e*, and the air sucked from it by means of the arm, *h*, the whole of the supernatant fluid is drawn off into the vessel, *i*, and the powder left in a fit state to be dried.[1] The coarser particles first separated may be again levigated, and the elutriation repeated. Chalk and some metallic matters are thus prepared; and the process may likewise be employed for separating substances of different degrees of specific gravity, although of the same degree of fineness.



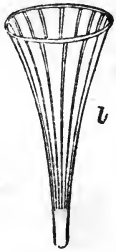
3. *Filtration* is intended for separating fluids from solid bodies suspended in them. Filters may be regarded as kinds of sieves; and are generally made either of very fine and close flannel, or of linen, or of unsized paper formed into a conical shape, through which the liquid percolates clear, while the solid is collected at the apex of the cone, which is inverted. When the quantity of materials is large, and the solid sus-

[1] The fluid may also be drawn off by means of wet cotton or worsted threads, having one end in the fluid, nearly touching the precipitate from which it is to be separated, and the other hanging over the side of the vessel, below the plane of the fluid in it.

pended in the fluid is not in the state of very fine powder, flannel or linen bags are to be preferred, as performing the process more quickly than paper. These are generally made in a conical shape, with the mouth stretched on a hoop or frame supported upon a wooden stand. When the solid residue is the part to be preserved, flannel filters may be used; but when the filtered liquor is the valuable product, linen is preferable, as it absorbs less of the fluid, which is obtained, also, in a more limpid state. The cloth must be well cleaned after every time that it is used, to prevent any thing from remaining to injure subsequent operations. For small processes, unsized paper is the best material for forming filters. A square piece of this paper, of a size proportionate to the quantity of the substance to be filtered, is taken, and first doubled from corner to corner into a triangle, which by a second doubling forms again a smaller triangle, and this when opened constitutes a paper cone, *k*, which is to be supported in a glass funnel, *l*, before the liquor is poured into it.



k



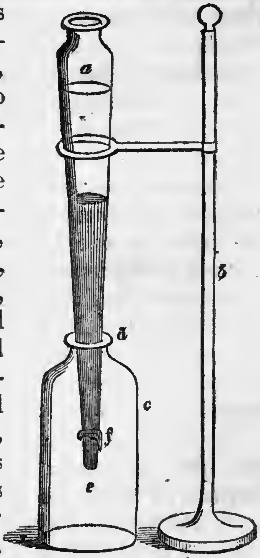
l

Funnels are made of tin, or of Wedgewood's ware, or of glass; but only the two latter should be used in the laboratory. Those which are ribbed are preferable, as the paper adheres so closely to the sides of smooth funnels as nearly to prevent the filtration from proceeding, unless pieces of straw, or quills, or thin glass rods, be arranged round the inside, so as to form an unequal surface for the paper to rest upon.

In most instances, the first portions of fluid that pass through a filter are turbid, and therefore require to be poured back again into the filter, sometimes repeatedly, until the pores of the filter are sufficiently obstructed to permit the most limpid part only of the liquor to pass. In cases where the solid residue is small, and it is requisite to collect the whole of it, it is useful to have a small glass tube, drawn out to a fine capillary point at one extremity, and blown to a globe in the centre; by filling which with distilled water, and putting the larger end into the mouth, the force of the breath can direct a small but strong stream of water round the sides of the paper in the funnel, which will wash down to its bottom all the minute particles of solid matter lodged on its sides.

The concentrated acids and alkaline solutions act too powerfully on the materials commonly employed for filters, to be filtered in the ordinary way; and therefore, when it is required that they should be filtered, which is not often the case, they are passed through strata of siliceous matter, arranged in a glass funnel, in the following manner:—An irregularly-shaped pebble is first dropped into the throat of the funnel; then a layer of pieces of quartz, or broken flint glass, is placed over it; and, lastly, a thick stratum of coarsely-powdered glass, or of well washed white sand, covers the whole. The substance to be filtered is poured gently on the surface of the sand, and soon passes through it and the substrata, leaving the impurities behind.

4. *Percolation* is a species of filtration which might be most beneficially employed for making tinctures. It is performed by means of an oblong funnel, *a*, which may be made of glass or of block tin; and it may be incased with another terminating a few inches from the top, and as many from the bottom, for holding hot water in operations in which the aid of heat is required. For ordinary purposes, the percolator, *a*, made of glass, may be supported by a brass stand, *b*, and the smaller extremity inserted into a wide-mouthed bottle, *c*, which it should only loosely fit, to enable the air to escape. The materials to be acted upon are to be rubbed up with an equal bulk of pure siliceous sand, then put into the percolator, over the lower orifice of which, *e*, a piece of calico, *f*, should be tied: lastly, the fluid, whether spirit or alcohol, must be poured over the materials, and the superior opening slightly stopped with a cork. By this method of operating, as a particle of sand is interposed between each particle of the materials, the spirit, in passing through, acts upon every side of it; and thus carries downwards all the soluble matter which it contains. Tinctures which, in the ordinary mode of maceration, require from seven to fourteen days to be perfected, are made by the percolator in as many hours. The whole of the tincture is obtained by pouring over the materials some water, towards the conclusion of the process; since the water drives before it the spirit, and remains in the percolator.



5. *Expression* is employed for obtaining the juice of fresh vegetables, and the unctuous vegetable oils. The subject is first bruised or coarsely ground, then enclosed in a hair-cloth bag, and subjected to violent pressure between the plates of a screw press. The bags should be nearly filled; and the pressure should be gentle at first, and gradually increased.

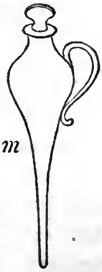
Vegetables, in general, intended to be expressed, should be perfectly fresh, and cleansed from all impurities; and should be submitted to the press as soon as they are bruised, as the bruising disposes them more readily to ferment; but subacid fruits yield more juice, and of a finer quality, when the bruised fruit is allowed to stand for some days in an earthen or a wooden vessel. It is necessary to peel oranges and lemons before pressing them, to prevent the essential oil which their rind contains from mixing with the juice: and to some vegetables, which are not very juicy, the addition of a little water is requisite.

For expressing the unctuous seeds, in order to obtain the oil which they contain, iron plates are employed; and the bruised seeds should be previously exposed in a bag to the steam of boiling water.

6. *Despumation* is employed to clarify fluids which are so thick and clammy as not to be able to penetrate through the substances of which filters are made, without some previous preparation. For this purpose it is sometimes required only to heat the liquor, which then throws up a scum that is to be carefully removed; but more frequently it is necessary to clarify it with the white of egg. When the substance is not spirituous, as syrup for example, the albumen which is mixed with the fluid coagulates when it is boiled, and, entangling the impurities of the fluid, rises with them to its surface in the form of scum; but spirituous liquors may be clarified with isinglass without the assistance of heat, the alcohol coagulating the isinglass, which forms a scum, and descending to the bottom of the vessel, carries with it all the impurities. Some expressed juices are clarified by the simple addition of any vegetable acid.

Besides the above methods of mechanically separating the parts of substances from one another, fluids of different specific gravities, mixed together, are separated by means of the separatory funnel, *m*. It is chiefly used for separating the essential oils from the water with which they are entangled during their distillation. The funnel is first stopped at the bottom, and then filled with the mixed fluids, the heaviest of which gradually subsides into the narrow part below; and when the cork at the bottom is taken out, and the stopper above a little loosened, it flows out; by which means the lighter is easily obtained in a separate state. Some of the essential oils are heavier, others lighter than water, but both can be thus separated with equal facility.

m



II. CHYMICAL OPERATIONS.

The operations of Pharmacy, which are strictly chymical, may be arranged in three classes.

a. Operations which produce changes in bodies, separating the constituents, without any obvious decomposition.

b. Operations in which changes are produced by the chymical action of one set of bodies upon another, or attended with obvious decomposition.

c. Operations in which the oxidizement and the deoxidizement of bodies are effected by means of a very high temperature.

a. Of the operations which produce changes in bodies, separating the constituents, without any obvious decomposition.

These changes are effected—

1. By Caloric—inducing	–	Liquefaction.
		Fusion.
		Evaporation.
		Exsiccation.
		Distillation.
		Rectification.
		Dephlegmation.
		Sublimation.
2. By water and other fluids	–	Solution.
		Lixiviation.
		Maceration.
		Digestion.
		Infusion.
		Decoction.
		Extraction.
3. By other chymical agents	–	Coagulation.

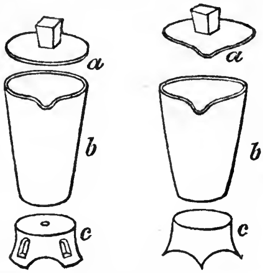
1. *Operations in which the changes are effected by caloric.*

Liquefaction is that operation by which certain bodies, when exposed to a moderate heat, are rendered fluid, after passing through several intermediate states of softness. Fat, lard, wax, resin, and many other similar bodies, undergo liquefaction; which is, therefore, employed in pharmacy to facilitate the combination of these bodies in the formation of ointments. The temperature at which liquefaction takes place is termed the melting point. It is always the same, in the same body. The best vessels for conducting the process of liquefaction are earthenware pans.

Fusion is a modification of liquefaction, but differs from it in the sudden change from the solid to the fluid state which those bodies, which are liable to it, suffer on exposure to heat. There are no intermediate states of softness; but the fusible body, when heated to a certain point, immediately assumes the fluid form. This point differs very considerably in different solids; but, in general, simple substances are less fusible than compounds; and some of the simple earths cannot be fused without the addition of some other substances to promote their fusion. These are generally saline bodies, and are denominated *fluxes*.

Fusion, which may take place without changing the nature of the fused matter, is intended as a mean of promoting chymical action, and of decomposing bodies. It is, however, generally confined to the metals, which are extracted from their ores, and afterwards smelted and alloyed by it. It is a species of operation occasionally employed in pharmaceutical processes.

Fusion is usually performed in crucibles[1], the best of which are made of very pure clay, or potter's earth. Those formed of common clay, with calcareous or siliceous earth, are easily vitrified, and then melt. The Hessian crucibles are composed of better clay and sand, and when good, stand the fire very well; as do also Wedgewood's crucibles; but they are apt to crack when suddenly heated or cooled,—a circumstance, however, which may be remedied by using a double crucible, and filling the interstice with sand, or by coating the crucible with a paste of clay and sand. Crucibles formed of black lead resist very sudden changes of temperature; but they are destroyed if nitre be melted in them; and even a current of air acting upon them whilst they are hot destroys them. Crucibles are made of various forms, three-cornered or round, *b*, *b*, and fitted with covers, *a*, *a*. The lids may be luted on, if necessary, with a mixture of clay and borax. Those crucibles which are of uniform thickness, which have a reddish brown colour, without black spots, and a clear sound when struck, are to be preferred.



In order to expose the lower part of a crucible to the utmost intensity of heat, and to prevent it from cracking by the draught of cold air which would be directed upon it, were it to be placed directly upon the grate of the furnace, it is usually raised upon a small stand, *c*, *c*, either solid or hollow, an inch above it, which, according to Dr. Kennedy, is the hottest part of the furnace.

Crucibles are also made of cast-iron, of fine silver, and of platinum. The, first, however, are destroyed when saline substances are melted in them; and, when made red-hot in a cur-

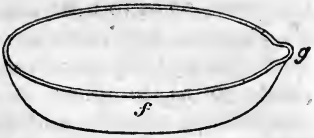
[1] The name crucible was derived from the alchemists having stamped upon the vessel the figure of the cross.

rent of air, are apt to suffer oxidation; but in other respects they are durable, and can sustain sudden alternations of heat and cold without cracking. Some of the metallic crucibles combine many of the best qualities necessary for this set of instruments; particularly those of platinum, which, however, are too expensive for ordinary use.

Evaporation is the dissipation of a liquid by means of heat, and is employed in pharmacy, generally with the view of obtaining, in a separate state, any fixed substance which may be combined with water, or some other evaporable fluid. Thus by exposing an aqueous solution of a salt to a certain degree of heat, the caloric which combines with the water renders it volatile, and disperses it in the form of an elastic aëriform fluid; while the particles of the salt, being brought nearer to each other, and within the sphere of their mutual attraction, reunite, and the salt is obtained in its concrete state. This process differs from spontaneous evaporation, in which air is the principal agent, the liquid being diminished in quantity and dissipated in that fluid, independent of the action of caloric; whereas evaporation is not carried on by the air, nor even much accelerated by the exposure of a large surface, but only in proportion to the quantity of caloric which combines with the fluid, or the degree of heat at which the process is conducted. As the fluid which is dissipated is entirely lost, and sacrificed for the sake of the fixed substance with which it was combined, evaporation is only employed where the liquid is of little value, such as water; but where a solid is to be recovered from a more valuable liquid, as alcohol, for instance, the process of distillation is employed.

For small processes, very good evaporating dishes are made of the bottoms of broken retorts and matrasses, which may be cut smooth round the edges by means of a hot iron or ring, *d*, with a wooden handle, *e*; and thus, they are converted into semiglobular basins.[1] The best evaporating dishes, however, are those of biscuit porcelain made by Wedgewood, and sold in assortments, the largest of which is capable of holding eight or ten pints. They are flat-bottomed, shallow vessels, *f*, with a lip, *g*, glazed in the inside; and thin, but of a dense hard texture. They will bear to be heated to the boiling point over a clear hot fire: but are apt to crack when a flame is allowed to play on them, or when the liquor is

[1] The iron ring for this purpose is made red-hot in the fire, then put upon the matrass which is to be cut; and, when the glass is sufficiently heated, by throwing on it a little cold water, it will generally break exactly at the circle heated by the iron ring.

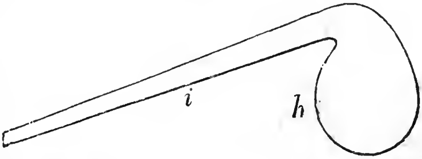


boiled to dryness, at the moment the last drop of fluid is expelled, unless the fire be much lowered. It is preferable, therefore, when glass or earthenware vessels are employed, to apply the heat by the medium of sand; or, if a still more moderate heat be necessary, by means of boiling water, over which the evaporating dish should be placed. The first is denominated a *sand bath;* the second, a *water bath;* but for processes on a large scale, shallow iron pots or leaden troughs are used, to which the fire is directly applied.

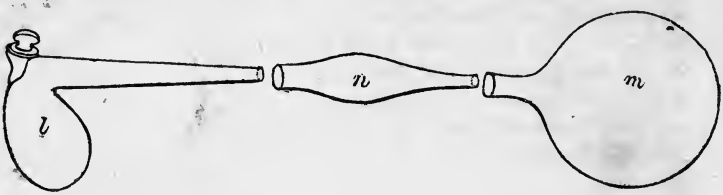
Exsiccation is a variety of evaporation, producing the expulsion of moisture from solid bodies by means of heat. It is generally employed for depriving salts of their water of crystallization. They are exposed to the action of a fire in an iron ladle or pot, or in a glass vessel; and after dissolving as they are heated, in the water they contain, or undergoing what is termed the *watery fusion,* the water boils; and, evaporating, leaves the salt in the form of a dry mass. When the substances to be exsiccated are liable to decomposition in a temperature above 212°, as is the case with some of the compound oxides, the process must be conducted by the heat of a water bath.

Distillation differs from evaporation only in the circumstance, that the vapour of volatile matter is elevated, to be condensed in close vessels, and preserved. The mode of conducting the operation, and the regulation of the heat, differ according to the nature of the substances operated on.

The simplest distilling apparatus for smaller processes is the *Retort* and the *Receiver.* The former consists of a nearly globular body, *h*, with a long gradually tapering beak, *i*, which is bent nearly at a right angle with the body. This is the simplest kind of retort; and if the materials to be distilled be liquid, they should be poured into the body of the vessel by means of a very long funnel, *k*, which, by reaching completely into it, prevents any thing from trickling down the sides of the neck. In withdrawing the funnel it is necessary to keep it applied to the upper part of the retort, that the drop hanging from it may not touch the inside of the neck. For nicer purposes the tubulated retort, *l*, is to be preferred. The bottom of either kind should be very thin, and of a uniform degree of

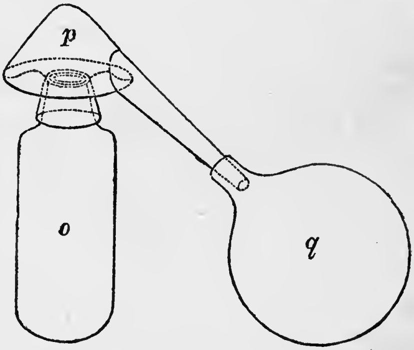


thickness, so as to bear the sudden application of heat from an Argand lamp, or even from a naked fire. The receiver *m*, should be larger than the retort, and of a globular form, so as to allow of a large surface for cooling the condensing vapour: and it may be either jointed directly to the retort, by the neck of the latter passing into it, or by the intervention of a third piece, *n*, denominated an *adopter;* and



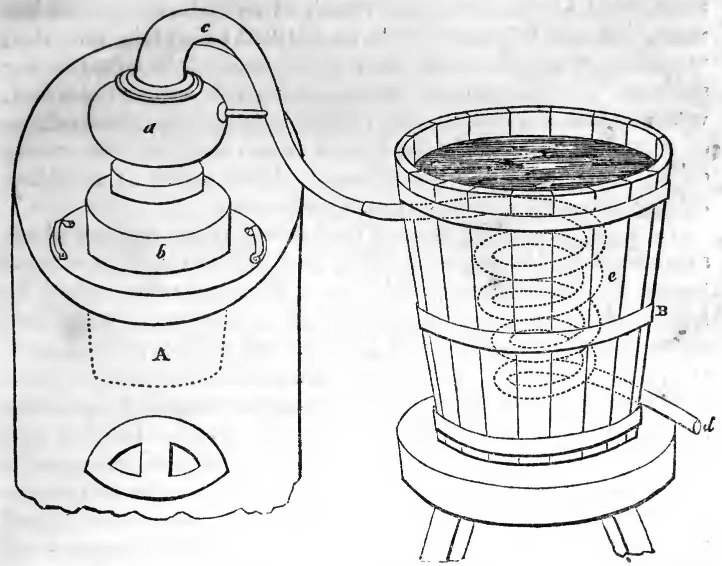
in either case the joinings are usually protected by lutes. When the substance to be condensed is of a very volatile nature, as ether, for instance, the receiver must be artificially cooled, and kept during the whole process at the temperature of the atmosphere, either by surrounding it with ice or snow, or allowing water to trickle slowly over it, brought down from a trough placed above the receiver by means of worsted threads. The constant evaporation which the water suffers, on the surface of the receiver, keeps it at the requisite degree of temperature for condensing the ether. Both the retort and the receiver may be tubulated.

Sometimes, instead of the retort and receiver, the stone ware cucurbit, *o*, with its capital, *p*, and receiver, *q*, is used. It is necessary, occasionally, to coat the retort and the latter-mentioned vessels with sand and clay, to enable them to sustain a high temperature, and the sudden alternations of heat and cold to which they are liable in common operations. By



these kinds of apparatus, acids, and other substances which arise from chymical decompositions, aided by heat, are distilled; and the process is named distillation *per latus;* but if the products be highly volatile, or of a gaseous nature, the pneumato-chymical apparatus, to be afterwards described, is required.

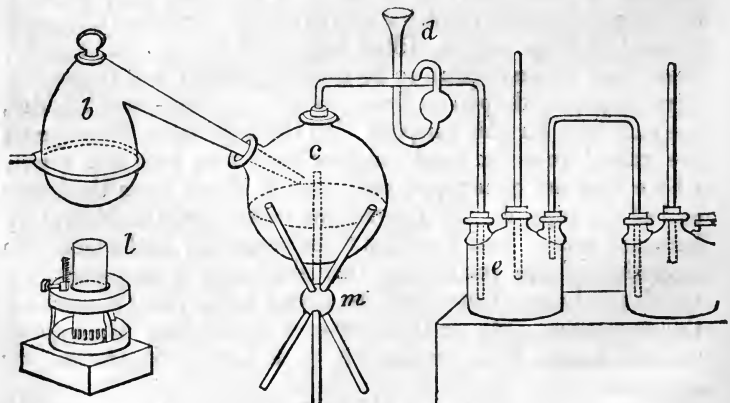
For the preparation of alcohol, and of distilled waters, the common still is employed. It consists of two parts—the



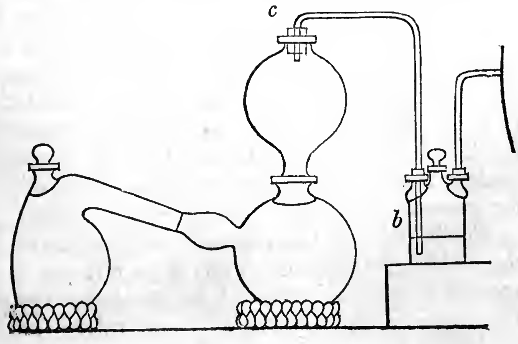
boiler, *b*, and the head or capital, *a*. The boiler, which is the part to which the fire is applied, and contains the materials, is generally of a cylindrical shape, and may be sunk into a furnace, or immersed in a water bath, A, when the temperature requires to be nicely regulated. The *head* or *capital* is a large hollow globe, the upper part of which is drawn out into a tapering pipe, *c*, bent to a curve or arch, and terminating in the serpentine, or worm, *e*. These parts are generally made of copper; but the *worm* is a long pewter pipe, of a decreasing diameter, which winds in a spiral direction obliquely through a deep tub, B, filled with cold water. The body, head, and worm require to be luted together; but in general slips of paper, dipped in flour paste, or pieces of wet bladder, are sufficient for this purpose. In this apparatus, the vapours are raised into the *head*, whence they pass into the *worm*, where they are condensed, and issue in drops from the lower end of the pipe, *d*. By degrees the water in the refrigeratory becomes warm, and requires to be renewed; and thence the necessity of the tub being furnished with a stop-cock, by which the heated water may be drawn off without disturbing the apparatus. As in this species of distillation the vapour ascends before it is condensed, it is named distillation *per ascensum*.

In some cases, as in the distillation of several essential oils, the vapour, instead of passing laterally, or ascending, is forced to descend. To produce this effect, a plate of tinned iron is fixed within any convenient vessel, so as to leave a space beneath it; and the materials to be distilled being laid upon this, they are covered by another plate accurately fitted to the sides of the vessel, and strong enough to support the fuel, which is burnt upon it. By this means, the volatilized matter of the materials, under the fire, is forced into the lower cavity of the vessel, and there condensed. This mode of distilling is denominated distillation *per descensum.*

In many processes, a large proportion of the vapours which are extricated is incondensible; and unless there were some means by which these could escape, the apparatus would be burst in pieces. To prevent accidents, therefore, a small hole was generally left, either in the joinings of the vessels, or in the receiver, which could be kept shut, and occasionally opened when the quantity of confined vapour was supposed to be such as might endanger the rupture of the vessels. By this contrivance, however, much condensible vapour escaped, and a large proportion of the products of the distillation was necessarily lost. This defect of the old apparatus was first attempted to be remedied by Glauber, whose hints were improved by Woulfe, the inventor of the apparatus now commonly employed. It consists of a retort, *b*, generally tubulated, in which the materials are heated by a lamp, *l*; a receiver, *c*, supported by a stand, *m*, to detain any part of the product which is condensible by cold; and a bent tube, proceeding from the receiver to the bottom of the bottle, *e*, with two apertures, and which is about half full of water. Several bottles, however, are generally employed; and these being placed side by side, are connected with one another by means of bent tubes,

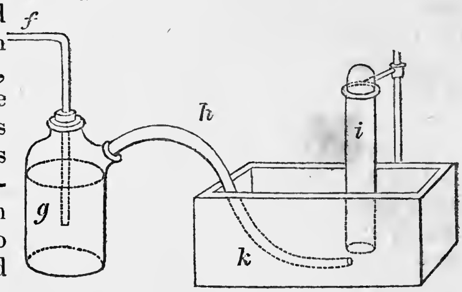


one limb of each proceeding from the top of the bottle immediately preceding, and the other plunging to the bottom of the liquid of the bottle next in order. The joinings of the apparatus are all made air-tight, except the opening of the last bottle farthest from the retort, so that any vapour which escapes must have passed through the liquid in the whole series of bottles, and left all its condensible matter, before it can escape. One inconvenience, however, attends this apparatus, when it contains no other parts than the above; which is, that after the distillation, as the retort cools, a vacuum is produced in it and the first receiver, which induces a suction or absorption from the other receivers through the bent tubes, and a retrograde motion of the liquid contained in them takes place through the whole apparatus; so that the products are mixed, unless the operator be on the watch to separate the retort and receiver, the moment the liquor begins to rise in the bent tube between the receiver and the first bottle. The best contrivance for remedying this defect, is the tube of safety, invented by *Welter*, and represented at *d*. It is a bent tube, with a bulb blown in that part of it which lies between the upper and lower flexure; and a small funnel at the top. This tube is sometimes used as a stopper to the tubulure of the retort, or to a separate opening in the receiver; or, as is represented in the cut, it is cemented into the tube passing from the receiver to the first bottle. When it is to be used, a little mercury is dropped into the funnel, so as to occupy the space of the tube which lies between the two lower flexures. The mercury excludes the external air during the distillation; but as soon as the vacuum is formed by the cooling of the vessel, the mercury is forced by the pressure of the atmosphere into the bulb; and not being in sufficient quantity to fill it, the external air passes by it in the bulb, and rushes into the apparatus: by which means the vacuum is filled up, and the absorption of the liquor prevented. Various modifications of this have been suggested; but the best is the invention of M. Pepys. It consists of a globular, or rather pyriform vessel, *c*, with which the receiver is surmounted, and into which it is accurately ground. This is furnished with



a glass valve, which allows gas to pass freely into it from the receiver, but prevents the water which it contains from falling into the receiver. From this a common tube rises, to connect the tubulated receiver, *b*, as in the former apparatus.

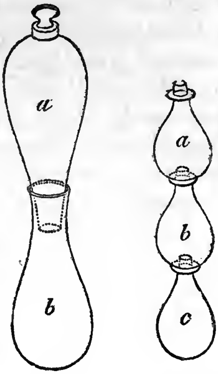
In chymical operations, when the gases which are separated during a process are to be preserved, the pneumatic trough, *k*, with its inverted jar, *i*, under which the curved tube, *h*, proceeding from the bottle, *g*, opens, is attached to Woulfe's apparatus. The construction of the trough differs according to the nature of the fluid with which it is filled.



If water be employed, the trough may be of stone ware, or of tinned iron, well japanned, and of an oblong or a circular shape. It may be about 18 inches long, 14 broad, and 8 inches deep; with a shelf of the same materials, which should extend entirely across the trough, and have two small holes in it, to convey the gas into the inverted jars set upon it; and two larger holes, to receive two bottle supporters. This trough should be nearly filled with water, and the jars intended to hold the gas should be also filled with the same liquid, and inverted; so that, when placed upon the shelf, the water in the trough may ascend about half an inch up their sides, which enables them to retain either water or gas. If mercury be employed, which is essential when the gases to be extricated are absorbable by water, the trough may be made of some hard wood, as mahogany, or of marble. It is not required to be so large as the trough for water, and one part only need be sunk; the shelf should be on each side of this part, which is called the well; and it is useful to have an iron or brass stem, supporting a semicircular clip, fastened into the substance of the trough, to support the jar when it is filled with mercury and inverted. By this apparatus, any gases given out during distillation may be collected and preserved; but this is a circumstance, in pharmaceutical operations, which is attended to more with the view of guarding the operator against the effect of noxious gases, than of preserving gases for examination.

Rectification is the repeated distillation of any product obtained by distillation, when it is not perfectly pure. This second operation is carried on at a lower temperature, so that the more volatile parts only are raised, and pass over into the receiver, leaving the impurities behind. When the fluid is simply rendered stronger, as in the case of alcohol, by bringing over the spirit, and leaving behind the superfluous water, the operation is named *dephlegmation* or *concentration.* The process is called *abstraction,* when the liquid is distilled off from any substance; and *cohobation,* when the product is redistilled from the same materials, or from a fresh parcel of the same materials.

Sublimation is a species of distillation in which the product of the volatilization is condensed in a solid form; but as this condensation takes place at a higher temperature than that of a watery vapour, a much more simple apparatus is required. The process is conducted sometimes in a crucible with a cone of paper or another crucible inverted over it, in which the product is condensed; and as in this case it is light and spongy, it was formerly denominated *flowers.* For other matters, which are less volatile, a cucurbit and capital, or a flask or phial, are employed, and sunk about two thirds in a sand bath. The aludel, *a, a, b, b, c,* which may be extended to any number of vessels, is generally used in this operation. The product in these cases is solid, and is denominated a *sublimate.*



b. Of the operations by which chymical changes are produced in the forms of bodies by the action of water, and other fluids.

When a solid body is thrown into a liquid and disappears, the transparency of the liquid remaining the same, the process is named *solution;* or *solution* is that operation by which the aggregation of a solid is overcome by a liquid, and a compound produced, which, retaining the fluid form, is transparent, and perfectly homogeneous. The liquid is generally supposed to be the substance exerting the active power, and has therefore been called the *solvent* or *menstruum.* It separates the particles of the solid or *solvend* from each other, and permanently suspends them by the state of combination into which they enter; but the attraction, as was before stated, is reciprocal, both as it regards the solid and the fluid. In general the solution of every solid in a liquid can be effected in a certain quantity only, or is limited; and when it is carried to its ultimate point, the liquid is said to be saturated. The solvent power, however, is not always limited, there being some instances in which a solid dissolves in a liquid in any proportion: thus gum and sugar dissolve in water in every proportion. The solvent power of a fluid diminishes as it approaches to saturation, and the solution consequently goes on more slowly; but by raising the temperature, it proceeds again more rapidly, and a much larger portion of the solid is taken up than could have been dissolved at a lower temperature. This effect of temperature, however, does not take place in every instance; for chloride of sodium, for example, and some other salts, can be dissolved in nearly as great quantity by cold as by hot water. When an increase of temperature augments the solubility of bodies, a portion of the solid, taken up by a heated liquid, is retained in combination as long as the increased temperature exists, but separates again as the solution is cooled down to the temperature of the atmosphere, or lower; and when this is properly conducted, salts are obtained in regular forms, or crystallization takes place.

Although a liquid be saturated with one solid, yet it may be still capable of dissolving a portion of another, and even of a third, when saturated with the second; until it be combined with, or hold in solution, three, four, or five different bodies at the same time. The liquid, indeed, in this case does not dissolve so large a portion of any of the substances; but sometimes, from the mutual affinities which the substances exert, the whole proportion of solid matter dissolved is very much increased.

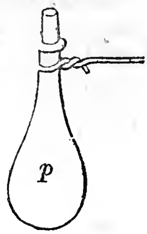
The solution of saline bodies in water requires no particular apparatus; as it can be conducted equally well in phials, or jars, or basins, provided the materials of which they are composed be such as can resist the action of the solvent.

Lixiviation is a term applied to solution when the saline body consists of both soluble and insoluble ingredients. On a great scale it is generally performed in large tubs or vats, having a hole near the bottom containing a wooden spigot and faucet. A layer of straw is placed at the bottom of the tub, over which the substance is spread, and covered by a cloth; after which, hot or cold water, according as the salt is more or less soluble, is poured on. The water, which soon takes up some of the soluble parts of the saline body, is after a little while drawn off by the spigot; and a fresh portion of water is successively added and drawn off until the whole of the soluble matter be dissolved. The straw in this operation acts as a filter; and the cloth prevents the water from making a hollow in the ingredients when it is poured on, by which it might escape without acting on the whole of the ingredients.

In smaller operations, lixiviation may be conducted in glass matrasses, and the *ley*, which is the name given to the solution, filtered through a paper in a glass funnel.

Maceration is that operation by which the soluble parts of substances, chiefly of a vegetable nature, are obtained in solution by keeping them immersed in *cold* water or in spirituous fluids for a sufficient length of time. It is frequently employed as a preparation for infusion and decoction, which are always rendered more effective by the previous maceration of the materials.

Digestion is an operation similar to maceration, except that the power of the fluid is aided by a gentle heat. It is usually performed in a glass matrass, *p*, and the evaporation of the liquid impeded by stopping the mouth of the matrass slightly with a plug of tow, or tying over it a piece of wet bladder perforated with small holes. When the menstruum is valuable, as alcohol, for instance, another matrass, with a smaller mouth, may be inverted over the former, and the joinings secured by a piece of wet bladder; or, what is perhaps preferable, a long open glass tube may be luted to the mouth of the matrass which contains the materials. By these means, any part of the liquor which is resolved into steam by the heat is condensed, and conveyed back upon the materials. The matrass may be heated either by a common fire, or a lamp, a water-bath, or a sand-bath; and, when either of the latter are used, the matrass should not be sunk deeper in the water, or the sand, than the portion that is filled. The process has been denominated *Circulation*, when the condensed vapours are returned upon the ingredients.



Infusion is intended principally to extract the volatile and aromatic principles of vegetable substances, which would be dissipated by digestion or decoction; and also those parts of vegetables which are more readily soluble in water, as gum, sugar, extract, tannin, the salts, and part of the resin, from the insoluble parts. The water is poured boiling hot on the materials, sliced, or reduced to a coarse powder, and kept in a closely covered vessel until they are cold; when the infusion or liquor is decanted off for use. The best infusion pots are of a globular form in the body, *q*, with the neck, *r*, cylindrical, and having a very large lip or spout, *s*, furnished with a grating, which should incline inwards towards the top, so as to retain the ingredients in decanting off the infusion. Infusions differ according to the length of time the water has stood on the materials, and the heat employed. In

some instances agitation is necessary. Infusions may be made with cold water; and these are in general more grateful, although weaker.

Decoction, or boiling, is intended to answer the same purposes as infusion: but in a more extended degree. The solvent power of the menstruum is increased by the degree of heat: hence the liquor is deeper coloured, and more loaded with the soluble principles of the vegetable. Decoction is employed with advantage to extract the mucilaginous parts of plants, their bitterness, and several other of the vegetable principles. It is generally performed in slightly covered vessels; but when the menstruum is valuable, as alcohol, for instance, a retort and receiver, or the common still, may be used, in the body of which the decoction is prepared, while the vapours that would otherwise escape are condensed and preserved.

Decoction, however, is often a prejudicial mode of preparation, particularly for those vegetables the virtues of which depend wholly or in part on the essential oil, or volatile principles they contain; and even some fixed principles, such as Extractive; the former are dissipated, the latter is oxidized and injured by it.

Extraction. If the liquor, which is obtained by either infusion or decoction, be subjected to evaporation, the watery part is dissipated, and the portion which was extracted by it is obtained in the solid form, and is denominated an *Extract.* The same objections may be urged against this species of preparation as were stated under *Decoction.*

All the forms of preparation in which water is the agent may be regarded as various modifications of solution. When alcohol or diluted spirits are employed as menstrua, the ingredients subjected to their action are generally macerated, and the filtered fluid, which is the product, is denominated a *Tincture.* (See PART III.)

c. *Of the operations in which changes are produced in bodies by chymical agents.*

Under this division we have only to notice *Coagulation*, which is the conversion of a fluid into a solid more or less consistent. The means employed for this purpose are increase of temperature, alcohol, acids, and runnets. The effect appears to arise from a new arrangement of particles produced by the affinity exerted between the solid particles contained in the fluid and the coagulating substance.

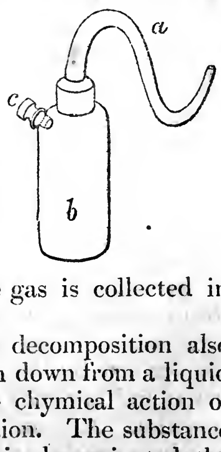
d. Of the operations in which changes are produced by the chymical action of one set of bodies upon another.

These are — Decomposition,
Dissolution,
Precipitation,
Crystallization,
Fermentation.

Decomposition implies the separation of the component parts of bodies from one another. It is produced, in some cases, by heat, or the introduction of caloric into a body in sufficient quantity to separate the particles from one another to a distance beyond their sphere of attraction, to overcome the affinity which held them in combination. It may be effected, also, by electricity or galvanism; but in the greater number of instances it is the result of a superior affinity, which breaks the weaker affinity that holds the principles of the substance about to be decomposed in union, and produces new compounds. The influence of decomposing affinities is greatly modified by heat.

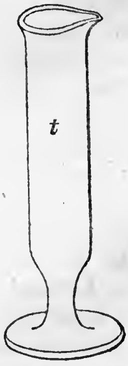
In pharmaceutical operations decomposition frequently occurs: and it is of the utmost importance in extemporaneous prescription, to be acquainted with the circumstances which cause it.

Dissolution is the appellation given to cases of solution accompanied with decomposition, or some alteration in the nature of the dissolved body. In general, the dissolution of a body is attended with considerable effervescence, owing to the extrication of gases; and therefore the operation requires to be performed in capacious vessels to prevent the loss of the materials. When the gas is required to be preserved, and the operation is not on a large scale, the proof bottle, *b*, is used. It is furnished with a tubulated orifice, *c*, for permitting the introduction of acid or any other decomposing agent, and with *a*, a curved tube, ground into the opening of the bottle, through which the gas escapes. The gas is collected in inverted jars in a pneumatic trough.



Precipitation is an operation in which decomposition also takes place, a solid substance being thrown down from a liquid in which it was held in solution, by the chymical action of another body, which is added to the solution. The substance employed to produce the precipitation is denominated the *precipitant;* the substance which is separated by its action, the *precipitate.* Thus, if into a solution of sulphate of magnesia a solution of soda be dropped, the magnesia separates from the sulphuric acid, falls to the bottom, and forms the precipitate; while the alkali, which is the precipitant, combining with the acid, thus set free, remains in solution in the state of sulphate of soda. Sometimes, the precipitate is separated, by the precipitant having a greater affinity for the liquid, and thence weakening its attraction to the substance which it held in solution. Alcohol, for example, when added to a saturated solution of sulphate of magnesia, precipitates the salt in a crystallized form, and combines with the separated water. In other cases the precipitate is an insoluble compound formed by the union of the added substance with that which was previously held in solution; as, when a solution of baryta is added to a solution of sulphuric acid, sulphate of baryta is formed and precipitated. The mixture of a solution of a compound salt with the solution of another compound salt may produce a precipitate which is an insoluble compound, while a new soluble compound is formed at the same time, and remains in solution; in which case the decomposition is produced by double elective attraction. Thus, if a solution of acetate of lead be added to a solution of sulphate of zinc, the oxide of lead leaves the acetic acid, and combining with the sulphuric, forms sulphate of lead, which is insoluble, and falls to the bottom; while acetate of zinc, formed by the union of the oxide of zinc with the acetic acid, remains in solution.

When the precipitate is the chief object of the process, it is necessary to wash it, after it is separated by filtration, This operation requires little attention when the substance thrown down is insoluble in water; but when it is in some degree soluble, attention is required to prevent the loss which might result from the use of too much water.



The best precipitating vessel is a very tall glass jar, *t*, narrower at the bottom than at the mouth, so that the precipitate may readily collect by subsidence, and the supernatant liquor be decanted off with more ease.

Precipitation is intended to separate solids from solutions in which they are contained; to produce new combinations which cannot readily be formed by the direct union of their constituents; and to purify solutions from perceptible impurities. A knowledge of those substances which produce precipitation is, also, of much importance in extemporaneous prescription, to prevent the virtues of remedies from being destroyed by improper combinations. The following Table displays the Precipitants of officinal substances.

1. ALKALIES.	PRECIPITANTS.[1]
Potassa	Tartaric acid, perchloric acid, muriate of platinum.
Soda	0.
Ammonia	Muriatic acid vapour.
2. SALTS OF METALLIC OXIDES.	
Baryta	Sulphuric acid, sulphates, carbonic acid, carbonates.
Lime	Oxalic acid, oxalates.
Magnesia	Pure alkalies, carbonates, and phosphate of soda.[2]
Alumina	Ammonia, potassa, alkaline carbonates, hydrosulphuret of potassa.
Silver	Muriates, hydrosulphurets, cyanides.
Mercury	Muriates, carbonates, acetates.
Copper	Iron, hydrosulphurets, ammonia.
Iron	Succinate of soda, benzoate of soda, hydrosulphurets, alkalies.
Lead	Sulphate of soda.
Zinc	0, alkaline carbonates?
Bismuth	Water, ammonia.
Antimony	Water, hydrosulphuret of potassa.
Arsenic	Nitrate of lead, hydrosulphurets.
3. ACIDS.	
Sulphuric	Muriate of baryta.
Carbonic	Muriate of an alkaline earth.
Boracic	Sulphuric acid.
Nitric	0.
Acetic	0.
Benzoic	Muriatic acid.
Succinic	Sulphate of iron.
Oxalic	Muriate of lime.
Tartaric	Potassa.
Citric	Acetate of lime.

In some cases when decomposition is effected by the addition of another substance, the separated body is not precipi-

[1] In strict language no precipitation takes place, but the fixed alkalies added to solutions containing ammonia render it perceptible by its odour.

[2] The precipitation of magnesia in this case is not direct; but to effect it a solution of carbonate of ammonia must first be added to the solution of muriate of magnesia; no precipitate will appear; but on adding phosphate of soda it falls down in an insoluble state, in combination with the phosphoric acid. Dr. Wollaston suggested this method.

tated, but rises to the surface, and is thence denominated a *cream;* thus, by the addition of any acid to a solution of soap, the alkali unites with the acid, while the oil is separated, and swims on the surface of the liquor.

Crystallization, although it can scarcely be regarded as a species of precipitation, yet is very nearly allied to it. We have already noticed the theory of the operation, and therefore it only remains to mention in this place the modes in which it is effected for pharmaceutical purposes.

For the crystallization of any substance, it is necessary that it should be either in the aëriform state or a state of fluidity, produced either by the agency of caloric or that of water.

Thus Camphor, Iodine, Arsenic, and Benzoic acid pass at once from a state of vapour into a regular crystalline form; while metals and other bodies, which are capable of being fused, crystallize if they be allowed to cool very slowly, and are left at the same time in a state of rest; but this species of crystallization is never required for pharmaceutical purposes.

Salts are obtained in a crystalline form by a proper management of their watery solutions. When the salt to be crystallized is considerably more soluble in hot than in cold water, as for example, *sulphate of soda*, it is only necessary to saturate hot water with the salt, and set it aside to cool; but this must be slowly effected, by covering the vessel to prevent the access of cold air, and the too rapid consequent formation of a pellicle, which would produce an irregular mass, instead of well formed, distinct crystals. Crystals thus formed, generally contain, in a state of combination with the salt, a considerable proportion of water, which is thence termed *water of crystallization.* When the salt is not more soluble in hot than in cold water, crystals are obtained by evaporating the solution while hot, until a pellicle forms on its surface; when it is set aside to cool, during which the crystals form. After these are separated, the evaporation is repeated, and another crop obtained, until, by a succession of evaporations, the greater part of the salt contained in the solution is separated in the crystalline state. The same effect may be produced by spontaneous evaporation.

The following method of obtaining very large and regular crystals has been pointed out by M. Leblanc.[1] The solution first evaporated to such a consistency that it shall crystallize on cooling; when it is cold, the liquor is poured off from the mass of crystals, which generally form at the bottom, and is put into a flat-bottomed vessel. In this, solitary crystals gra-

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[1] *Journal de Physique,* lv. 300.

dually form, the largest of which are to be picked out and placed in another flat-bottomed vessel at some distance from each other, and a quantity of liquid, obtained in the same way by evaporating a solution of the salt till it crystallizes on cooling, poured over them. The position of each crystal is now to be altered once a day by means of a glass rod; for, when not turned, the face on which the crystal rests receives no increase of size. When they have gained considerably in magnitude, the most regular are to be selected, and each of them put separately into a vessel filled with the same liquid, and turned as already described several times a day, until they attain the largest size which the species of crystal under treatment is capable of acquiring. It is, however, necessary to observe, that if the crystals be allowed to remain too long in one portion of the solution, the quantity of salt it contains becomes so much diminished, that the liquid re-acts upon the crystal, and partially dissolves it.

If a crystallizable salt be perfectly pure, the whole of its solution may be crystallized: but if two or more salts exist in the same solution, after crystals have been obtained by several successive evaporations and coolings, the remaining portion of the fluid, although saturated with saline matter, yet refuses to crystallize, and is then denominated *mother water*.

The vessels best adapted for crystallization are large flat dishes of Wedgewood's ware, such as have been already described as proper for the evaporation of liquids. When the crystallization is to be conducted slowly in the heat of the atmosphere, with the free access of air, deeper vessels are required, that there may be a considerable body of liquid; by which means crystals of considerable size and very regular in figure are procured. Sometimes the crystallization, particularly when it is effected without the aid of heat, is disturbed by minute crystals forming on the edge of the vessel, and the saline matter extending itself over its sides. This is best prevented by smearing the edge of the evaporating dishes with a little oil.

Crystallization is intended to obtain crystallizable substances in a pure state; and to separate them from one another, by taking advantage of their different solubility at different temperatures.

FERMENTATION.

The constituents of vegetable matter, when separated from the living plant, and placed under certain circumstances, act upon one another, and a spontaneous decomposition takes place, even at the ordinary temperature of the atmosphere. This process has been denominated *Fermentation* by chymists, on account of the intestine motion with which it is accompanied; and, as its phenomena and results vary according to the nature of the vegetable matter subjected to it, and the circumstances under which it occurs, the general process is divided into three species easily distinguished from one another. The 1st is named the *vinous fermentation*—of which the products are wine, beer, and other vinous fluids: the 2d, the *acetous fermentation*, which produces acetic acid of vinegar; and the 3d, the *putrefactive fermentation*, in which gases, chiefly fœtid, are produced, and ammonia.

Each of these is occasionally artificially produced for pharmaceutical purposes, and therefore requires to be described.

Vinous fermentation. All vegetable substances containing saccharine matter, and a peculiar glutinous principle analogous to the gluten of wheat, are susceptible of this fermentation. For its commencement, however, the presence of water, sugar, extract, and a small proportion of vegetable acid, with a certain increased temperature, is requisite. In juices in which these are present, the fermentation is spontaneous; but, as *yeast* contains the peculiar gluten, and the other principles necessary for exciting the vinous fermentation in any sweet vegetable juice or decoction, it is frequently used for this purpose in the formation of beer and wines. Soon after yeast is added to these substances, or to *wort*[1], or to *must*[2], an intestine motion commences in the liquor, its temperature rises, it becomes turbid, and carbonic acid gas is extricated, and a scum, or hat, as it is termed, is formed on the surface of the liquid: but, after some time, the fermentation again gradually subsides, the scum which was formed during its continuance sinks to the bottom; the liquor becomes lighter, and instead of its sweet taste has acquired that peculiar taste and flavour which is denominated vinous. This process of fermentation is never employed in the laboratory for the preparation of vinous liquors, although these are articles of the materia medica: but the cataplasms, which are prepared from carrots and similar vegetables mixed with yeast, derive their virtues from the vinous fermentation into which they enter, extricating a large quantity of carbonic acid gas, which operates as a powerful sedative antiseptic.

Acetous fermentation. All liquors prepared by the vinous fermentation are susceptible of the acetous when kept exposed

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[1] Wort is an aqueous infusion of malt. It consists of saccharine matter, starch, gluten, tannin, and mucilage.

[2] Must is the expressed juice of the grape. It contains water, sugar, a peculiar matter which changes into gluten by contact with the air, mucilage, supertartrate of potassa, tartrate of lime, muriate of soda, and sulphate of potassa.

to the air in a temperature between 70° and 90°. Under these circumstances the liquor gradually becomes thick, its temperature increases, and filaments are seen moving through it in every direction, an intestine motion being excited, accompanied with a hissing noise: but as this motion subsides, these filaments fall to the bottom, or attach themselves to the sides of the vessel: the liquor becomes clear and transparent, and has acquired a very sharp acid taste. In this state it is denominated vinegar, and contains, besides the acetic acid and water, which are its principal components, mucus, malic acid, supertartrate of potassa, and some other vegetable constituents.

Pure alcohol, even when diluted with water, is not susceptible of this fermentation, but it enters into it when united with other fermentable bodies: thence wine and vinous liquors, which contain, besides alcohol, sugar and some mucilaginous and extractive matter, are employed for making vinegar. In this process the alcohol is supposed to be decomposed, and oxygen absorbed: carbonic acid is formed, but is retained in the liquor; and it is probable, as Dr. Murray suggested, that the ferment affords the nitrogen, which enters into the composition of the acetic acid.[1]

Many vegetable infusions and decoctions undergo this fermentation in warm weather; and thence the necessity of preparing these every day during summer, as by the decomposition which takes place, their medicinal virtues are completely destroyed, when they are kept.

Putrefactive Fermentation. Almost every vegetable product kept in a moist place, and in a temperature not under 45°, nor above 70°, undergoes spontaneous decomposition. The solid structure of the body is completely destroyed, and its ultimate principles, entering into new combinations, escape in the gaseous or aëriform state, leaving behind a small quantity of earthy and metallic matter only, which it contained.

This process, which is denominated the *putrefactive fermentation*, does not absolutely require the contact of air; but water, in every case, appears to be essential. Vegetable bodies, which are very soluble in water, most readily undergo it; the surface of the liquor becomes covered with a mould; various elastic fluids, in which ammonia and phosphureted hydrogen gas are often perceptible, with other matters which produce a fœtid odour, are extricated, and the vegetable matter is ultimately completely decomposed.

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[1] *System of Chymistry*, iv. 465.

The knowledge of the circumstances which promote this species of spontaneous decomposition points out the necessity of preserving vegetable substances in perfectly dry places and, when they have a tendency to attract moisture, of exposing them in a free current of air to dissipate the humidity which they would otherwise absorb.

c. Of the operations in which oxidizement and deoxidizement are effected by means of a high temperature.

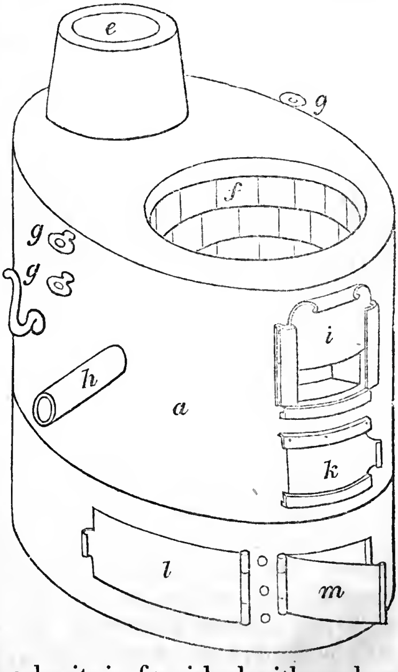
The degree of temperature at which these operations are conducted cannot generally be obtained from a common fire; and therefore, before describing the operations themselves, it is necessary to notice the nature of furnaces, which are instruments of the most universal use in pharmaceutical chymistry.

Furnaces differ in construction, according to the particular purposes for which they are chiefly intended; but the following essential parts are common to all furnaces:—1st, The body or fire-place, for holding the fuel and the vessel containing the materials to be submitted to the action of heat. 2dly, The chimney, by which the heated air and the smoke escape. 3dly, The ash-pit, into which the ashes fall, and through which fresh air is admitted to the burning fuel.

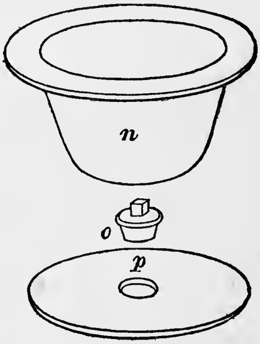
In a well constructed furnace, the whole of the air which enters the ash-pit passes through the body of the furnace, and supports the combustion, after which the residue, being highly rarified, passes off by the chimney; on the due height of which, and the proper regulation of the access of atmospheric air from below, the strength of the combustion, and consequently the heat produced, altogether depend. The access of the air is generally regulated by registers; which, in portable and smaller furnaces, are iron plates pierced with many holes of different sizes, which are generally fitted with brass stoppers, so that, according to the number of holes opened, a greater or smaller quantity of air is admitted to the burning fuel. The chimney should be narrower than the body of the furnace, and of such a length that it can be heated throughout by the rarified air which ascends through it; for it is by producing in the chimney a column of air of much less specific gravity than a corresponding column of the external air, that fresh air is constantly forced through the body of the furnace from below, and a strong draught produced. If the chimney be too short, all the advantage to be derived from the above circumstance is not obtained; and if, on the other hand, it be too long, the air loses its heat before it reaches the summit, and impedes, to a certain extent, the ascent of the rarefied air. According to Macquer, when the internal diameter of the furnace is 12 or 15 inches, and that of the chimney 8 or 9, its height should be 18 or 20 feet.

Of whatever substance furnaces are made, unless they be fixed and built of fire-bricks, they should be coated, to prevent the radiation, and consequent loss of heat: and the best composition for this purpose is clay and sand. It is perhaps better, however, first to put a coating of charcoal and clay next to the sides of the furnace, as was recommended by Dr. Black, particularly if the furnace be made of plate iron. The proportions he recommended were one part, by weight, of fine clay, and three parts of charcoal; which, being reduced to powder, is kneaded together with water, and the mass thus formed divided into balls of a moderate size. These being applied to the sides of the furnace, are to be beat strongly with the face of a broad hammer, until a general coating of about one inch and a half cover the inside of the furnace, and the cavity assume an elliptical form.

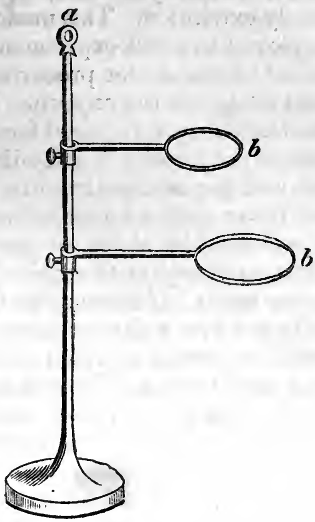
A very convenient and useful furnace is that which was contrived by Dr. Black. It consists of an oval iron case, *a*, about 22 inches in height, 20 inches in diameter in the length of the oval, and 15 inches across; and lined in the body with the coating already described. On the top is fixed an iron plate having two apertures; one large, *f*, intended to receive a sand bath, a still, or similar apparatus; and the other smaller, *e*, to which an iron tube, which acts as a chimney, is to be fixed. At the bottom of the body of the furnace, directly under the larger aperture, the grate is fixed; and under it the ash-pit receives the body, resting on a strong ring that encircles it, at about half an inch deep. The ash-pit is furnished with a door, *m*, which opens on hinges, intended for removing the ashes;



and also a register to regulate the admission of air to the burning fuel. The register is a plate of iron perforated with six apertures, the size of which increases in a geometrical ratio; so that by passing the sliding plate, *l*, over them, either one or more may be stopped at a time, and the supply of air, and of course the heat to be excited, can be regulated with great nicety. The fuel is introduced at the top; but there is a door also, *i*, occasionally, in the side of the body of the furnace, through which fuel can be supplied during the conducting of any process; although, unless it be made to shut very close, this door is a disadvantage, as it prevents the admission of the air from being so precisely regulated. It has also an opening, *k*, with a sliding door, for receiving a muffle: *h* is an earthen or an iron tube, which passes through the body of the furnace, and issues at the opposite side, intended for procuring hydrogen gas; or for inserting the nozzle of a pair of bellows. Any thing may be suspended over the furnace by inserting an iron pillar into the eyes, *g g*, on each side, and stretching a strong bar or wire between them. The sand bath, *n*, is placed in the opening, *f*, of the furnace, when it is required; but at other times that opening is shut by the cover, *p*, which has a moveable plug, *o*, in its centre. A pair of tongs, *r*, bent near the points, is a necessary appendage to this furnace. It may be used for a great variety of operations, and may be fitted with a dome for the purpose of throwing down the flame when it is to be used for fusing metals.



For small operations, when a great heat is required, a furnace may be constructed by simply inverting one large black lead, or a Hessian crucible, over another which is perforated with six holes in the bottom, which are intended to serve as a grating. This is placed over the portion of a third, cut off so low as to leave the cavity about an inch deep only, and ground smooth above and below. The upper or inverted pot should have a large perforation to permit the heated air to escape, and the portion on which the second pot stands should also be perforated at the side to admit the external air, or the nozzle of a bellows. No luting is required. A heat sufficient to fuse any metal may be obtained in such a furnace.



A sufficient heat for a great variety of small operations may be obtained from a lamp, on the principle of Argand's, with a double concentric wick. A standard, *a*, having movable rings, *b*, *b*, attached to it, is necessary for supporting the retort or matrass at any height above the flame.

With regard to *fuels*, the best are undoubtedly charcoal and coke, or a mixture of these. The advantages of *charcoal* are its kindling readily, burning with a strong clear heat in a small draught, without running into slag, choking the grate, or melting the walls of the furnace; and owing to its containing only matter which is extremely combustible, the flues or chimneys never collect soot or other foulnesses. The chief objection to charcoal is its great price. *Coke* is much less expensive; but as it contains a mixture of earth and metallic oxides, it is apt in an intense heat to run together into a tough, cohesive slag, which adheres to the walls of the furnace, and to the sides of crucibles, choking up the grate, and of course preventing the proper draught of air for carrying on the combustion. These disadvantages, however, are remedied by mixing it with an equal bulk of charcoal; and this mixture forms the best fuel, when an intense heat is required.

The pharmaceutical operations usually performed by furnaces are —

Fusion.
Distillation.
Sublimation.
The oxidizement of metals.
The deoxidizement or reduction of metals.

The three first of these have been already described.

Oxidizement of metals. This term signifies that process by which metals are converted into oxides, by absorbing oxygen from the air, when exposed to a certain degree of heat. The disengagement of the caloric and the light which oxygen gas contains, by the solidification of the oxygen in the oxide, is scarcely perceptible when the operation is conducted in atmospheric air; but if the oxidizement takes place in oxygen gas, it is rapidly effected, and caloric and light are very evidently extricated. This mode, however, of oxidizing metals is employed in small experiments only; but in all the processes of the laboratory for procuring oxides by the aid of heat, common air yields the oxygen. The metal, if it be not volatile at the temperature required for its oxidizement, is exposed to the heat of the furnace in a flat dish of baked clay, called a *roasting test*, and frequently stirred to present fresh surfaces to the air: but if the matter be easily volatilized, as is the case with zinc, it is thrown by pieces, at separate intervals, into a deep crucible, so placed as to admit the air and allow of the additions being made. If mercury be the metal operated on, it is generally put into a flat-bottomed matrass with a very tall narrow neck, the mouth of which is left open. This matrass is placed in a sand bath, and kept at a degree of heat nearly equal to the boiling point of the mercury, for many days: but it is perhaps better to use a retort with the bottom flattened, and the neck only slightly bent, that the globules of mercurial vapour may be condensed, and the metal fall back into the vessel.[1] In this process the atmospheric air furnishes the oxygen, which readily combines with the volatilized mercury, while theform of the apparatus is intended to permit a renewal of it constantly to take place, without allowing the escape of the mercurial vapour.

Deoxidizement of metals, or their reduction, is that process in which the oxygen of a metallic oxide is separated, and the metal recovers its metallic form and properties. It is seldom performed on a large scale in pharmacy: but in cases of metallic oxides having been taken into the stomach, and proving fatal, it is of importance, in ascertaining their nature, to be able to reduce them to the metallic state by means of the blowpipe and lamp; an apparatus by which minute substances may be almost instantaneously heated to a great degree, and their nature discovered with much accuracy.

The most common blow-pipe is a tube of brass or iron, bent near one of its extremities, and drawn out sufficiently fine to keep up a constant stream of air when it is blown into by the mouth applied to the opposite end. This form of blow-pipe is liable to one inconvenience, from the condensation of the moisture of the breath, in the course of blowing; to remedy which, a hollow ball or bulb, *a*, is made near the small end of the pipe; and, to render it more portable, this is divided through the middle, and fitted with a screw, so as to be put together

[1] *Higgin's Minutes. Aikin's Dictionary*, ii. 75.

when used. Small separate jet-pipes, or caps, are frequently adapted to slip on the small extremity of the blow-pipe, by which means any size of bore may be had recourse to, as a larger and more moderate, or a smaller and more intense flame is required. The flame for blowing through is best obtained from a wax or tallow candle with a very large wick, which must be kept moderately short by snuffing it frequently, and it must also be turned a little aside from the pipe.

In using this apparatus with advantage and ease, a little practice is necessary. As the flame is often required to be kept up for several minutes, the respiration must be carried on through the nostrils without interruption, and the stress of blowing performed merely by the compression of the cheeks upon the air held in the mouth. In subjecting any substance to experiment, it is to be placed either on a piece of charcoal or in a platina spoon. When charcoal is employed, a large, compact, well-burnt piece should be chosen, and a small shallow hole scooped in it for receiving the substance to be heated. The flame of the candle or lamp is then to be directed upon this by means of the blow-pipe. The charcoal soon kindles round the hole, which is gradually enlarged; and the heat being thereby augmented and kept up uniformly round the substance, the charcoal aids, by its chymical effect, the reduction of the substance, or its deoxidizement. Carbonate of lead, thus treated, is converted into a globule of metallic lead; and the phosphates are partially reduced to phosphurets.

In many operations, much inconvenience arises in using the common blow-pipe, from both the hands of the operator being engaged; and therefore a double pair of bellows, which is fixed below the table, and worked by the foot of the artist, has been invented for giving the blast. Means have also been contrived for producing the blast by a stream of oxygen gas, or of mixed gases, as of oxygen and hydrogen, which excite a much more intense heat than can be produced by any other method.[1] A very ingenious blow-pipe is that of Mr. Paul of Geneva, in which the flame is produced by vapour of alcohol.[2]

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[1] For descriptions of a blow-pipe invented by Mr. Newman for this purpose, and improved by Dr. Clarke and others, see *Journ. of Science and the Arts*, vol. ii. p. 104. *Annals of Philosophy*, vol. viii. *passim*. *London Med. Repository*, vol. vi. p. 376. vol. vii. p. 21.

[2] *Mr. Paul's alcohol blow-pipe*. *a*, a hollow frame of wood, five inches in its longest dimensions, supporting the pillar *d*, and the two lamps *b*, *c*; the rim *e*, slips upon the pillar *d*, as low as the shoulder of the latter will permit, but it may be raised or lowered at pleasure, and kept fast by the screw-peg, *f*. The rim supports *g*, the boiler, which is a hollow piece of thick brass, which will hold about f℥ij. of alcohol, and has four openings; three, *h*, *i*, *k*, at the top, and one at the bottom, to receive the tube *o*. The latter is long enough to reach the level of the outside of the boiler, and consequently the alcohol in the boiler cannot readily boil over into the tube; and the opening, *k*, which corresponds with it, is

COATINGS, CEMENTS, AND LUTES.

In many chymical operations, although the nature of the substances require that glass vessels be used, yet, from the degree of heat to which they are exposed, these must be protected on the outside by a coating; and in all operations where the products are in any degree volatile, it is of importance that the joinings of the parts of the apparatus should be perfectly secured; thence the necessity of coatings and lutes. Cements are requisite for repairing flaws and cracks.

Coatings are applied to the insides of furnaces, to prevent the too quick dissipation of the heat, and also to protect the iron and materials of which the furnace is made from being destroyed by the action of the fire. The coating used by Dr. Black has been already described; but another nearly as good may be formed by coarsely grinding fragments of pottery, and mixing the powder with moist clay in sufficient quantity to allow it to be moulded when wet. To render it more tenacious, some fibrous matter is generally added to the mixture, such as chopped cow-dung; the proportion of which, as recommended by Baumè, should be one ounce to every five

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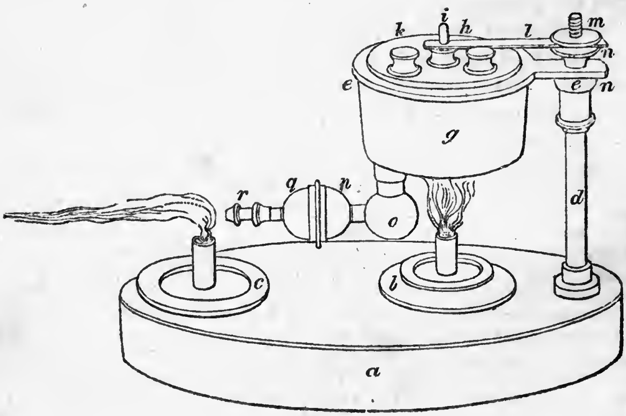
closely shut by a screw-stopper, hollowed out a little beneath, to allow the free passage of the vapour down the tube. By the contiguity of *o* to the lamp *b*, the vapour is prevented from condensing, and as it passes on through the globe *p*, *q*, into the jet tube *r*, it is directly kindled by the flame of the lamp *c*; and the united flames being violently propelled sideways, a long pencil of blue flame is formed, and remains as long as any alcohol is left in the boiler. The boiler is filled at the opening *h*. The central hole, *i*, is nicely fitted with a brass plug, kept down by a thin slip of iron, *l*, which is confined at one end between two flat screws, *m*, *n*, on the top of the upright pillar. This acts as a safety-valve, to prevent the vessel from bursting when the vapour cannot escape quick enough at the jet-pipe *r*.



ounces of the mixture. This is to be applied in the manner already described.

The same kind of coating may be used for glass vessels which are to be exposed to a red heat. The following is the mode of applying it. After kneading the coating material, so as to render it very plastic, let it be spread out on a flat table, and lay the bottom of the retort in the middle of the mass; then turn up the edges of the cake, so as to bring it round the whole of the vessel, pressing it down in every part with the fingers till it apply uniformly and closely. The material may also be applied in the state of thick cream, by dipping the retort repeatedly into it; and drying it after each immersion by turning it before the fire. The different layers of coating may be thus laid on very equally, from the thickness of $\frac{1}{4}$ to $\frac{1}{2}$ an inch; so as to make the retort resemble a strong earthen retort glazed in the inside; and, as the coating agglutinates in a full red heat, it will form an impenetrable covering which cannot be detached from the glass.

Cements and *Lutes* are formed of the same materials. They are generally composed of unctuous or resinous substances; mucilaginous or gelatinous substances; or of clay, lime, and similar materials capable of resisting a high degree of heat.

a. *Unctuous and resinous Lutes.*—These should be viscid, plastic, compact, and possess the power of resisting acrid vapours. The following are the best of this class.

1. Melt eight parts of bees' wax with one of turpentine; and according as it is required to be more or less consistent or pliable, add different proportions of any resinous substance. This lute adheres very closely to the glass, is not easily penetrated by acrid vapours, and is very manageable. It cannot bear a heat higher than 140°.[1]
2. Dissolve spermaceti; and when melted, while it is hot, throw into it bits of caoutchouc. This is an excellent lute where much heat is not required to be employed.
3. Take pure, dry, unbaked clay, finely powdered, beat it for several hours with a heavy iron pestle in a brass mortar, dropping in, slowly, some boiled linseed oil; or some amber varnish, prepared by melting yellow amber in an iron ladle, and mixing it with linseed oil. This lute can sustain a considerable degree of heat, is impenetrable by acids and spirituous liquors, and adheres very strongly to metallic or glass vessels previously rendered perfectly dry. As it softens in some degree, however, by heat, it is necessary to surround the luting with pieces of wet bladder, and to secure the whole by packthread firmly

1 *Lavoisier.*

tied round both above and below the joint.[1] This lute improves by age. It should be kept in a covered pan in a cool cellar.

4. Glazier's putty, which is a composition of chalk and drying linseed oil, resembles very much the above lute in its qualities, and may be used as a substitute for it.
5. Take four parts of common resin, one of yellow wax, and one part of fine brickdust; melt the two former together, and when they are melted, stir in the brickdust. This lute adheres with great firmness, and forms also a good cement for stopping cracks in glass vessels.
6. Six parts of clay, one part of iron filings, and enough of linseed oil to form them into a paste, make a good cement for stopping cracks in iron vessels intended to be strongly heated.
7. The following cement is recommended for joining together glass or steel:—"Take of mastich five or six bits as big as peas, and dissolve them in as much alcohol as will render them liquid. In another vessel dissolve as much isinglass (previously soaked in water) in brandy or rum as will make two fluid ounces of a strong glue; warm it, and incorporate with it, by rubbing, two or three small bits of galbanum, or ammoniacum, and the mastich solution. Preserve the mixture in a well-stopped bottle, and gently warm it before use."[2]
8. A solution of shell lac in alcohol, added to a solution of isinglass in proof spirit, forms a cement that will resist moisture.

b. *Mucilaginous and gelatinous Lutes* are adapted only for operations which do not require a high temperature, and in which very acrid vapours are not extricated. They are easily applied, are sufficiently adhesive, and can be readily removed by simply moistening them with water.

1. Under this head may be mentioned the simple application of moistened bladder. To render it very adhesive, it should be soaked in tepid water, until it feels clammy to the touch; after which it contracts considerably as it dries, and adheres with a sufficient degree of force.
2. Linseed meal kneaded up with water to a sufficient consistence, and applied pretty thick over the joinings of the vessels, or almond meal treated in the same manner, form very convenient lutes, which dry and become firm in a very short time.
3. Flour paste spread upon slips of moistened paper forms a sufficiently good lute for many purposes.

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[1] *Lavoisier.* [2] *Aikin's Dictionary of Chymistry.*

4. Smear slips of linen on both sides with white of egg; then apply these neatly to the joinings of the vessels; and when they have been applied, shake loosely over them some finely powdered quicklime. This lute dries very quickly, is extremely hard, very cohesive, impervious to water, and impenetrable by most kinds of vapours.
5. Mix powdered plaster of Paris with white of egg, milk, glue, starch, or any mucilage, and apply it immediately.
6. Mix together equal parts of clay and lime, with about one third of flour and white of egg.
7. Mix together equal parts of colcothar and lime, with white of egg.

All the cements containing lime and gelatinous substances become so very hard that they cannot be separated from glass vessels without the aid of a sharp knife and some force; and, therefore, they can scarcely be applied to very thin vessels. They will not confine very corrosive acid vapours for a great length of time; but are excellent lutes for preserving a complicated apparatus steadily united and air-tight; and they will bear nearly a red heat. They are also the most useful kinds of cement for any accidental crack or failure of a lute already applied, although a stream of vapour may be bursting through at the time.[1]

c. *Earthy Lutes* are intended for operations which require a high temperature. The following are the best of this class:
1. Mix burnt gypsum, in powder, with water to the consistence of a thick cream, and apply it immediately. This forms a lute which sets as soon as it is applied, and is firm; but a slight blow will easily crack it.
2. Dissolve one ounce of borax in half a pint of boiling water, and add as much slacked lime as will make a paste. By using a smaller portion of lime, this lute forms an excellent glazing for earthenware retorts, over which it should be spread with a brush; but when dry, a coating of slacked lime and linseed oil, beaten till the mixture is plastic, should be laid over the whole of the lute.
3. A very valuable fire lute may be made of about one part of glass of borax, five parts of brickdust, and five parts of clay, finely powdered together, and mixed with a little water when used.
4. The same composition which has been already described as a proper coating for the inside of furnaces, is also an excellent earthy lute.
5. Six parts of clay, and one of iron filings formed into a paste by means of linseed oil, form an excellent cement for stopping cracks in iron retorts or boilers.

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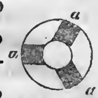
[1] *Aikin's Dictionary of Chymistry.*

If the beak of a retort be too small to fit accurately to the neck of a receiver, the vacancy should be filled up by introducing short pieces of soft wood or of cork, *a, a, a;* and if the disproportion be very considerable, a cork must be fitted to the neck of the receiver, and a circular hole made in it sufficient to admit the beak of the retort. The curved tube of a Woulfe's apparatus, when not fitted accurately by grinding, may be also fixed by means of corks. After the parts are thus firmly joined, the luting must be neatly and closely applied over the junctures; and the whole covered with slips of wet bladder, or with linen spread with one or other of the above-described cements. The application of the lutes, although apparently very simple, yet requires some management, lest the luting of one juncture should disturb another already luted, which is apt to happen when applying the fillets and ligatures. When an operator, therefore, is not pressed for time, he should always allow the luting of one joint to dry before he applies luting to another; indeed, it is preferable not to apply the fillets and ligatures, until after the luting has been applied to all the joints, and is nearly hard.



APPENDIX TO PART I.

No. I.

TABLE OF FREEZING MIXTURES.

The following Tables were drawn up by Mr. Walker from actual experiments. They show the degree of cold, or the reduction of temperature, which may be obtained by the different combinations mentioned in the first column.

TABLE I.

FRIGORIFIC MIXTURES—*WITHOUT ICE.*

Mixtures.	Thermometer sinks.	Degree of cold produced.
Parts. Muriate of ammonia 5 Nitrate of potassa - 5 Water - - 16	From + 50° to + 10°	40
Muriate of ammonia 5 Nitrate of potassa - 5 Sulphate of soda - 8 Water - - 16	From + 50° to + 4°	46
Nitrate of ammonia 1 Water - - 1	From + 50° to + 4°	46
Nitrate of ammonia 1 Carbonate of soda - 1 Water - - 1	From + 50° to — 7°	57
Sulphate of soda - 3 Diluted nitric acid - 2	From + 50° to — 30°	80
Sulphate of soda - 6 Muriate of ammonia 4 Nitrate of potassa - 2 Diluted nitric acid - 4	From + 50° to — 10°	60
Sulphate of soda - 6 Nitrate of ammonia 5 Diluted nitric acid - 4	From + 50° to — 14°	64
Phosphate of soda - 9 Diluted nitric acid - 4	From + 50° to — 12°	62
Phosphate of soda - 9 Nitrate of ammonia 6 Diluted nitric acid - 4	From + 50° to — 21°	71
Sulphate of soda - 8 Muriatic acid - 5	From + 50° to — 0°	50
Sulphate of soda - Diluted sulphuric acid	From + 50° to — 3°	53

N. B. If the materials are mixed at a warmer temperature than that expressed in the table, the effect will be proportionably greater; thus, if the most powerful of these mixtures be made when the air is + 85°, it will sink the thermometer to + 2°.

TABLE II.

FRIGORIFIC MIXTURES—*WITH ICE.*

Mixtures.	Thermometer sinks.	Degree of cold produced.
Parts. Snow, or pounded ice 2 Muriate of soda - 1	From any temperature to $-5°$	*
Snow, or pounded ice 5 Muriate of soda - 2 Muriate of ammonia 1	to $-12°$	*
Snow, or pounded ice 24 Muriate of soda - 10 Muriate of ammonia 5 Nitrate of potassa - 5	to $-18°$	*
Snow, or pounded ice 12 Muriate of soda - 5 Nitrate of ammonia 5	to $-25°$	*
Snow - - - 3 Diluted sulphuric acid 2	From $+32°$ to $-23°$	55
Snow - - - 8 Muriatic acid - 5	From $+32°$ to $-27°$	59
Snow - - - 7 Diluted nitric acid 4	From $+32°$ to $-30°$	62
Snow - - - 4 Muriate of lime - 5	From $+32°$ to $-40°$	72
Snow - - - 2 Cryst. muriate of lime 3	From $+32°$ to $-50°$	82
Snow - - - 3 Potassa - - 4	From $+32°$ to $-51°$	83

N. B. The reason for the omission in the last column of this table, is the thermometer sinking in the mixtures to the degree mentioned in the preceding column, and never lower, whatever may be the temperature of the materials at mixing.

TABLE III.

COMBINATION OF FRIGORIFIC MIXTURES.

Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced.
Phosphate of soda - Nitrate of ammonia Diluted nitric acid	5 3 4	From 0° to − 34°	34
Phosphate of soda - Nitrate of ammonia Diluted mixed acids	3 2 4	From − 34° to − 50°	16
Snow - - - Diluted sulph. acid *Or,* Diluted nit. acid	8 3 3	From − 10° to − 56°	46
Snow - - - Diluted nitric acid	3 2	From 0° to − 46°	46
Snow - - - Diluted sulphuric acid	1 1	From − 20° to − 60°	40
Snow - - - Muriate of lime -	3 4	From + 20° to − 48°	68
Snow - - - Muriate of lime -	3 4	From + 10° to − 54°	64
Snow - - - Muriate of lime -	2 3	From + 15° to − 68°	53
Snow - - - Cryst. muriate of lime	1 2	From 0° to − 66°	66
Snow - - - Cryst. muriate of lime	1 3	From − 40° to − 73°	33
Snow - - - Diluted sulph. acid	1 10	From − 68° to − 91°	23

N. B. The materials in the first column are to be cooled, previously to mixing, to the temperatnre required, by mixtures taken from either of the preeeding tables.

No. II.

TABLES OF SIMPLE AFFINITY.

The following Tables were drawn up by Bergman, and additions made to them by others at different times. The substance, the attractions of which are to be shown, is placed at the head of a column, and the substances to which it has an attraction, placed beneath, in the order of the forces of attraction.

OXYGEN.

Carbon
Charcoal
Manganese
Zinc
Iron
Tin
Antimony
Hydrogen
Phosphorus
Sulphur
Arsenic
Nitrogen
Nickel
Cobalt
Copper
Bismuth
Caloric?
Mercury
Silver
Arsenous acid
Nitric oxide
Gold
Platina
Carbonic oxide
Muriatic acid
White oxide of manganese
White oxide of lead

OXYGEN.*

Titanium
Manganese
Zinc
Iron
Tin
Uranium
Molybdena
Tungsten
Cobalt
Antimony
Nickel
Arsenic
Chrome
Bismuth
Lead
Copper
Tellurium
Platina
Mercury
Silver
Gold

CARBON.

Oxygen
Iron
Hydrogen

NITROGEN.

Oxygen
Sulphur
Phosphorus
Hydrogen

HYDROGEN.

Oxygen
Sulphur
Carbon
Phosphorus
Nitrogen

SULPHUR. PHOSPHORUS.

Potassa
Soda
Iron
Copper
Tin
Lead
Silver
Bismuth
Antimony
Mercury
Arsenic
Molybdena

POTASSA, SODA, and AMMONIA.

Acids:
Sulphuric
Nitric
Muriatic
Phosphoric
Fluoric
Oxalic
Tartaric
Arsenic
Succinic
Citric
Lactic
Benzoic
Sulphurous
Acetic
Mucic
Boracic
Nitrous
Carbonic
Hydrocyanic
Oil
Water
Sulphur

BARYTES.

Acids:
Sulphuric
Oxalic
Succinic
Fluoric
Phosphoric
Mucic
Nitric
Muriatic
Suberic
Citric
Tartaric
Arsenic
Lactic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic
Sulphur
Phosphorus
Water
Fixed Oils

STRONTITES.

Acids:
Sulphuric
Phosphoric
Oxalic
Tartaric
Fluoric
Nitric
Muriatic
Succinic
Acetic
Arsenic
Boracic
Carbonic
Water

LIME.

Acids:
Oxalic
Sulphuric
Tartaric
Succinic
Phosphoric
Mucic
Nitric
Muriatic
Suberic

* Vauquelin's Table of the affinity of the metals for oxygen, according to the difficulty with which their oxides are decomposed by heat.

TABLES OF SIMPLE AFFINITY—*continued.*

Acids:
Fluoric
Arsenic
Lactic
Citric
Malic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic
Sulphur
Phosphorus
Water
Fixed oil

MAGNESIA.

Acids:
Oxalic
Phosphoric
Sulphuric
Fluoric
Arsenic
Mucic
Succinic
Nitric
Muriatic
Tartaric
Citric
Malic
Lactic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic
Sulphur

ALUMINA.

Acids:
Sulphuric
Nitric
Muriatic
Oxalic
Arsenic
Fluoric
Tartaric
Succinic
Acids:
Mucic
Citric
Phosphoric
Lactic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic

SILEX.

Fluoric acid
Potassa

OXIDE OF PLATINA.

OXIDE OF GOLD.*

Acids:
Gallic
Muriatic
Nitric
Sulphuric
Arsenic
Fluoric
Tartaric
Phosphoric
Oxalic
Citric
Acetic
Succinic
Hydrocyanic
Carbonic
Ammonia

OXIDE OF SILVER.

Acids:
Gallic
Muriatic
Oxalic
Sulphuric
Mucic
Phosphoric
Sulphurous
Nitric
Arsenic
Fluoric
Tartaric
Citric

Acids:
Lactic
Succinic
Acetic
Hydrocyanic
Carbonic
Ammonia

OXIDE OF MERCURY.

Acids:
Gallic
Muriatic
Oxalic
Succinic
Arsenic
Phosphoric
Sulphuric
Mucic
Tartaric
Citric
Malic
Sulphurous
Nitric
Fluoric
Acetic
Benzoic
Boracic
Hydrocyanic
Carbonic

OXIDE OF LEAD.

Acids:
Gallic
Sulphuric
Mucic
Oxalic
Arsenic
Tartaric
Phosphoric
Muriatic
Sulphurous
Suberic
Nitric
Fluoric
Citric
Malic
Succinic
Lactic
Acetic
Benzoic
Boracic

Acids:
Hydrocyanic
Carbonic
Fixed oils
Ammonia

OXIDE OF COPPER.

Acids:
Gallic
Oxalic
Tartaric
Muriatic
Sulphuric
Mucic
Nitric
Arsenic
Phosphoric
Succinic
Fluoric
Citric
Lactic
Acetic
Boracic
Hydrocyanic
Carbonic
Fixed alkalies
Ammonia
Fixed oils

OXIDE OF ARSENIC.

Acids:
Gallic
Muriatic
Oxalic
Sulphuric
Nitric
Tartaric
Phosphoric
Fluoric
Succinic
Citric
Acetic
Hydrocyanic
Fixed alkalies
Ammonia
Fixed oils
Water

OXIDE OF IRON.

Acids:
Gallic

* Omitting the oxalic, citric, succinic, and carbonic, and adding sulphureted hydrogen after ammonia.

TABLES OF SIMPLE AFFINITY—*continued.*

Acids:
Oxalic
Tartaric
Camphoric
Sulphuric
Mucic
Muriatic
Nitric
Phosphoric
Arsenic
Fluoric
Succinic
Citric
Lactic
Acetic
Boracic
Hydrocyanic
Carbonic

OXIDE OF TIN.

Acids:
Gallic
Muriatic
Sulphuric
Oxalic
Tartaric
Arsenic
Phosphoric
Nitric
Succinic
Fluoric
Mucic
Citric
Lactic
Acetic
Boracic
Hydrocyanic
Ammonia

OXIDE OF ZINC.

Acids:
Gallic
Oxalic
Sulphuric
Muriatic
Mucic
Nitric

Acids:
Tartaric
Phosphoric
Citric
Succinic
Fluoric
Arsenic
Lactic
Acetic
Boracic
Hydrocyanic
Carbonic
Fixed alkalies
Ammonia

OXIDE OF ANTIMONY.

Acids:
Gallic
Muriatic
Benzoic
Oxalic
Sulphuric
Nitric
Tartaric
Mucic
Phosphoric
Citric
Succinic
Fluoric
Arsenic
Lactic
Acetic
Boracic
Hydrocyanic
Fixed alkalies
Ammonia

SULPHURIC ACID. HYDROCYANIC.*

Baryta
Strontites
Potassa
Soda
Lime
Magnesia
Ammonia
Glucine
Yttria
Alumina
Zircon
Metallic oxides

SULPHUROUS ACID. SUCCINIC.†

Baryta
Lime
Potassa
Soda
Strontites
Magnesia
Ammonia
Glucine
Alumina
Zircon
Metallic oxides

PHOSPHORIC ACID. CARBONIC.‡

Baryta
Strontites
Lime
Potassa
Soda
Ammonia
Magnesia
Glucine
Alumina
Zircon
Metallic oxides
Silex

PHOSPHOROUS ACID.

Lime
Baryta
Strontites
Potassa
Soda
Ammonia
Glucine
Alumina
Zircon
Metallic oxides

NITRIC ACID. MURIATIC ACID.§

Baryta
Potassa
Soda
Strontites
Lime
Magnesia
Ammonia
Glucine
Alumina
Zircon
Metallic oxides

FLUORIC ACID. BORACIC ACID.‖ ARSENIC ACID.¶ TUNGSTIC ACID.

Lime
Baryta
Strontites
Magnesia
Potassa
Soda
Ammonia
Glucine
Alumina
Zircon
Silex

ACETIC ACID. LACTIC ACID. SUBERIC ACID.**

Baryta
Potassa
Soda
Strontites
Lime
Ammonia
Magnesia††
Metallic oxides
Glucine
Alumina
Zircon

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* With the omission of all after ammonia.

† Ammonia should come before magnesia; and strontites, glucine, and zircon be omitted.

‡ Magnesia should stand above ammonia, and alumina and silica be omitted.

§ Ammonia should stand above magnesia.

‖ Silex should be omitted, and water and alcohol inserted. ¶ Except silex.

** With the omission of strontites, metallic oxides, glucine, and zircon.

†† Magnesia should stand above ammonia.

TABLES OF SIMPLE AFFINITY—*continued.*

OXALIC ACID.

TARTARIC ACID.

CITRIC ACID.*

Lime
Baryta
Strontites
Magnesia
Potassa
Soda
Ammonia
Alumina
Metallic oxides
Water
Alcohol

BENZOIC ACID.

White oxide of arsenic
Potassa
Soda
Ammonia
Baryta
Lime
Magnesia
Alumina

CAMPHORIC ACID.

Lime
Potassa
Soda
Baryta
Ammonia
Alumina
Magnesia

FIXED OILS.

Lime
Baryta
Potassa
Soda
Magnesia
Oxide of mercury
Metallic oxides
Alumina

ALCOHOL.

Water
Ether
Volatile oil
Alkaline sulphurets

SULPHURETED HYDROGEN.

Baryta
Potassa
Soda
Lime
Ammonia
Magnesia
Zircon

No. III.

TABLES *of the Specific Gravities of Substances, which are Articles of the Materia Medica, at a Temperature of* 60° *of Fahrenheit.*

METALS AND INFLAMMABLES.

Mercury (distilled) -	13·568
Sulphuret of mercury	10·000
Bichloride of mercury	5·2
Calomel - - - -	7·2
Lead - - -	11·352
Silver - - -	10·474
Bismuth - - -	9·822
Copper - - -	8·895
Arsenic - - -	5·8843
Sulphuret of arsenic (red)	3·225
——— (yellow)	5·315
Iron - - -	7·788
Sulphuret of iron -	4·513
Tin - - -	7·291
Zinc - -	6·861 to 7·1
Manganese - -	6·850
Antimony - -	6·702
Sulphuret of antimony	4·62
Sodium - - -	0·972
Potassium - -	0·865
Phosphorus - -	1·714
Sulphur - -	1·99
Charcoals -	0·223 to 1·526
Bitumens -	0·892 to 1·357

SALINE SUBSTANCES.

Sulphuric acid -	1·842
Nitric acid - -	1·583
Hydrochloric - -	1·1940
Acetic - - -	1·0629
Vinegar -	1·0135 to 1·0251
Distilled vinegar	1·007 to 1·0095
Citric acid - -	1·0345
Benzoic - - -	0·667
Arsenious - -	3·7
Potassa (hydrate) -	1·7085
Soda (do.) - -	1·336
Ammonia, liquid -	0·936
Lime - -	2·3
Magnesia - -	2·3
Baryta - - -	4·00
Alumina - -	2·000
Sulphate of potassa -	2·298
——— soda -	2·462
——— magnesia	1·6603
Alum - -	1·719
Nitrate of potassa -	1·933
Chloride of sodium -	2·120
Hydrochlorate of ammonia	1·45
Chloride of calcium -	1·76

* Zircon after alumina.

Chloride of barium	2·8257
Phosphate of soda	1·338
Acetate of potassa	2·1—?
Tartrate of potassa	1·5567
——— and soda	1·757
Bitartrate of potassa	1·953
Carbonate of potassa	2·012
——— soda	1·421
——— ammonia	0·966
——— lime	2·7
——— magnesia	2·56
——— baryta	4·331
Sub-borate of soda	1·720

METALLIC SALTS.

Mercury, bichloride of	5·1398
——— chloride	7·1758
——— subsulphate	6·444
Copper, sulphate of	2·1943
——— acetate	1·779
Iron, sulphate of	1·880
——— carbonate	3·333
——— acetate	1·368
Lead, carbonate of	6·72
——— superacetate	2·345
Zinc, sulphate of	1·912

VEGETABLE SUBSTANCES AND PRODUCTIONS.

Cinchona bark	0·7840
Logwood	0·9130
Madder root	0·7650
Mahogany	1·0630
Red saunders	1·1280
Sassafras	0·4820
Gum-arabic	1·355
Hepatic aloes	1·3586
Socotorine aloes	1·3796
Amber (yellow)	1·065—1·07
Ammoniacum	1·2071
Assafœtida	1·3275
Benzoin	1·0924
Camphor	0·9887
Catechu	1·4573
Elemi	1·0682
Euphorbium	1·1244
Galbanum	1·2120
Galipot	1·0819
Gamboge	1·2216
Guaiacum	1·2289
Honey	1·45
Myrrh	1·3600
Olibanum	1·1732
Opium	1·3359
Opoponax	1·6226
Resin (common)	1·0727
Sagapenum	1·2008
Scammony (Aleppo)	1·2354
——— (Smyrna)	1·2743
Storax	1·1098
Sugar (refined)	1·6060
Tragacanth	1·8161
Turpentine	9·991
Wax (yellow)	0·9648
——— (white)	0·9686

FATS AND OILS.

Fat of beef	0·9232
——— mutton	0·9235
——— pork	0·9368
Tallow	0·9419
Butter	0·9423
Spermaceti	0·9433
Oil of linseed	0·9403
——— olives	0·9153
——— almonds	0·9170
Naphtha	0·753
Oil of cinnamon	1·044
——— cloves	1·036
——— lavender	1·894
——— mint	0·8982
——— rosemary	0·9057
——— chamomile	0·8943
——— savine	0·9294
——— caraway	0·9049
——— aniseed	0·9867
——— juniper	0·8577
——— turpentine	0·8697
——— amber	0·8867
Sulphuric ether	0·632
Nitric ether	0·9088
Alcohol	0·794
Proof spirit	0·916

Water (distilled)	1·000

No. IV.

RULES *for reducing the Volume of Gases to a mean Height of the Barometer, and mean Temperature.*[1]

1. *From the space occupied by any quantity of gas under an observed degree of pressure, to infer what its volume would be under the mean height of the barometer, taking this at 30 inches.*

This is done by the rule of proportion; for, as the mean height is to the observed height, so is the observed volume to the volume required. For example, if we wish to know what space would be filled, under a pressure of 30 inches of mercury, by a quantity of gas, which fills 100 inches, when the barometer is at 29 inches.

30 : 29 : : 100 : 96·66.

The 100 inches would, therefore, be reduced to 96·66.

2. *To estimate what would be the volume of a portion of gas, if brought to the temperature of* 60° *Fahrenheit.*

Divide the whole quantity of gas by 480; the quotient will show the amount of its expansion or contraction by each degree of Fahrenheit's thermometer. Multiply this by the number of degrees which the gas exceeds, or falls below 60°. If the temperature of the gas be above 60°, subtract, or if below 60°, add the product to the absolute quantity of gas; and the remainder in the first case, or sum in the second, will be the answer. Thus, to find what space 100 cubic inches of gas at 50° would occupy if raised to 60°, divide 100 by 480; the quotient 0·208 multiplied by 10 gives 2·08, which added to 100 gives 102·08, the answer required. If the temperature had been 70°, and we had wished to know the volume, which the gas would have occupied at 60°, the same number 2·08 must have been subtracted from 100, and 97·92 would have been the answer.

3. *In some cases it is necessary to make a double correction, or to bring the gas to a mean both of the barometer and thermometer.*

We must then first correct the temperature, and afterwards the pressure. Thus to know what space 100 inches of gas at 70° Fah., 29 inches barometer, would fill at 60° Fah., and 30 inches barometer, we first reduce 100 inches, by the second process, to 97·92. Then, by the first

30 : 29 : : 97·92 : 94·63.

Or 100 inches, thus corrected, would be only 94·63.

4. *To ascertain what would be the absolute weight of a given column of gas at a mean temperature, from the known weight of an equal volume at any other temperature.*

First find by the second process what would be its bulk at a mean temperature; and then say, as the corrected bulk is to the actual weight, so is the observed bulk to the number required. Thus, if we have 100 cubic inches of gas weighing 50 grains at 50° Fah., if the temperature were raised to 60°, they would expand to 102·08. And

102·08 : 50 : : 100 : 49.

Therefore 100 inches of the same gas at 60° would weigh 49 grains.

5. *To learn the absolute weight of a given volume of gas under a mean pressure, from its known weight under an observed pressure,* say, as the observed pressure is to the mean pressure, so is the observed weight to the corrected weight. For example, having 100 inches of gas which weigh 50 grains under a pressure of 29 inches, to know what 100 inches of the same gas would weigh, the barometer being 30 inches.

29 : 30 : : 59 : 51·72.

Then 100 inches of the same gas, under 30 inches pressure, would weigh 51·72 grains.

6. *In some cases it is necessary to combine the two last calculations.* Thus, if 100 inches of gas at 50° Fah., and under 29 inches pressure, weigh 50 grains, to find what would be the weight of 100 inches at 60° Fah., and under 30 inches of the barometer, first correct the temperature, which reduces the weight to 49 grains. Then,

29 : 30 : : 49 : 50·7.

100 inches, therefore, would weigh 50·7 grains.

[1] Vide *Henry's Elements of Experimental Chymistry*, vol. ii. p. 497.

No. V.

TABLES *of the Correspondence between Measures of Weight and Capacity: according to the Estimations given by Sir George Shuckburgh Evelyn, in vol.* 88 *of the Phil. Trans., corrected by Mr. Fletcher, in the* 4*th Vol. of the Philosophical Journal.*[1]

TABLE I.

For converting Cubic Inches of Water, (at 60° Therm. and 29·5 Bar.) into their equivalents in Troy Weight.

Cubic Inch of Water.		*Troy grs.*		*oz.*		*drachms.*		*grs.*
1	weighs	252·506	=	0	:	4	:	12·506
2	*cubic inches* weigh	505·012	=	1	:	0	:	25·012
3		757·518	=	1	:	4	:	37·518
4		1010·024	=	2	:	0	:	50·024
5		1262·530	=	2	:	5	:	2·530
6		1515·036	=	3	:	1	:	15·036
7		1767·542	=	3	:	5	:	27·542
8		2020·048	=	4	:	1	:	40·048
9		2272·554	=	4	:	5	:	52·554
1728 (1 cubic foot)		———		909	:	0	:	10·368

TABLE II.

For converting Troy Grains, Drachms, Ounces, and Pounds of Water into their equivalent Cubic Inches.

Grains.		*Cubic Inch.*	*Drachm.*		*Cubic Inch.*
1	=	·00396	1	=	·237618
2	=	·00792	2	=	·475236
3	=	·01188	3	=	·712854
4	=	·01584	4	=	·950472
5	=	·01980	5	=	1·188090
6	=	·02376	6	=	1·425708
7	=	·02772	7	=	1·663326
8	=	·03168			
9	=	·03564			

Ounce.		*Cubic Inch.*	*Pound.*		*Cubic Inch.*
1	=	1·900945	1	=	22·81134
2	=	3·801890	2	=	45·62268
3	=	5·702835	3	=	68·43402
4	=	7·603780	4	=	91·24536
5	=	9·504125	5	=	114·05670
6	=	11·405670	6	=	136·86804
7	=	13·306615	7	=	159·67938
8	=	15·207560	8	=	182·49072
9	=	17·108505	9	=	205·30206
10	=	19·009450			
11	=	20·910395			

[1] Not having the Fourth Volume of the Philosophical Journal by us, we have copied these Tables from the Appendix of Aikin's Dictionary.

TABLE III.

For converting Wine Pints of Water into their equivalent Troy and Avoirdupois Pounds.

Wine Pints.		*lbs. Troy.*		*lbs.*	*oz.*	*dr.*	*grs.*		*lbs. Avoirdup.*
1	=	1·26581783	=	1 :	3 :	1 :	31·1	=	1·04158725
2	=	2·53163566	=	2 :	6 :	3 :	2·2	=	2·08317450
3	=	3·79745349	=	3 :	9 :	4 :	33·3	=	3·12476175
4	=	5·06327132	=	5 :	0 :	6 :	4·4	=	4·16634900
5	=	6·32908915	=	6 :	3 :	7 :	35·5	=	5·20723625
6	=	7·59490698	=	7 :	7 :	1 :	6·6	=	6·24952350
7	=	8·86072481	=	8 :	10 :	2 :	37·7	=	7·29111075
8	=	10·12654264	=	10 :	1 :	4 :	8·8	=	8·33269800
9	=	11·39236047	=	11 :	4 :	5 :	39·9	=	9·37438525

TABLE IV.

For converting Troy Pounds of Water into their equivalent Wine Pints.

Troy Pounds.		*Wine Pints.*	*Troy Pounds.*		*Wine Pints.*
1	=	0·7900031	6	=	4·7400186
2	=	1·5800062	7	=	5·5300217
3	=	2·3700093	8	=	6·3200248
4	=	3·1600124	9	=	7·1100279
5	=	3·9500155			

TABLE V.

For converting Avoirdupois Pounds into their equivalent Troy Pounds.

lbs. Avoird.		*lbs. Troy.*	*lbs. Avoird.*		*lbs. Troy.*
1	=	$1{\cdot}21527\dot{7}$	6	=	$7{\cdot}29166\dot{6}$
2	=	$2{\cdot}43055\dot{5}$	7	=	$8{\cdot}50694\dot{4}$
3	=	$3{\cdot}64583\dot{3}$	8	=	$9{\cdot}72222\dot{2}$
4	=	$4{\cdot}86111\dot{1}$	9	=	$10{\cdot}93750\dot{0}$
5	=	$6{\cdot}07638\dot{8}$			

TABLE VI.

For converting Troy Pounds into their equivalent Avoirdupois Pounds.

lbs. Troy.		*lbs. Avoirdup.*	*lbs. Troy.*		*lbs. Avoirdup.*
1	=	$0{\cdot}8228571\dot{4}$	6	=	$4{\cdot}93\dot{7}1428\dot{5}$
2	=	$1{\cdot}64\dot{5}7142\dot{8}$	7	=	$5{\cdot}\dot{7}600000\dot{0}$
3	=	$2{\cdot}46\dot{8}5714\dot{2}$	8	=	$6{\cdot}58\dot{2}8571\dot{4}$
4	=	$4{\cdot}\dot{2}914285\dot{7}$	9	=	$7{\cdot}\dot{4}057142\dot{8}$
5	=	$4{\cdot}1\dot{1}42857\dot{1}$			

TABLE VII.

For converting Ounces, Drachms, and Grains Troy into Decimals of the Troy Pound.

Grains.	lbs. Troy.	Drachms.	lbs. Troy.	Oz.	lbs. Troy.
1 =	·000173611	1 =	·0104166	1 =	·0833
2 =	·000347222	2 =	·0208333	2 =	·1666
3 =	·000520833	3 =	·0312500	3 =	·2500
4 =	·000694444	4 =	·0416666	4 =	·3333
5 =	·000868055	5 =	·0520833	5 =	·4166
6 =	·001041666	6 =	·0625000	6 =	·5000
7 =	·001215277	7 =	·0729666	7 =	·5833
8 =	·001388888			8 =	·6666
9 =	·001562500			9 =	·7500
				10 =	·8333
				11 =	·9166

TABLE VIII.

For converting Decimals of the Troy Pound into Troy Ounces, Drachms, and Grains.

lbs.	oz.	dr.	gr.	lbs.	oz.	dr.	grs.	lbs.	grs.
·1 =	1 :	1 :	36	·01 =	0 :	0 :	57·6	·001 =	5·76
·2 =	2 :	3 :	12	·02 =	0 :	1 :	55·2	·002 =	11·32
·3 =	3 :	4 :	48	·03 =	0 :	2 :	52·8	·003 =	17·28
·4 =	4 :	6 :	24	·04 =	0 :	3 :	50·4	·004 =	23·04
·5 =	6 :	0 :	0	·05 =	0 :	4 :	48·0	·005 =	28·80
·6 =	7 :	1 :	36	·06 =	0 :	5 :	45·6	·006 =	34·56
·7 =	8 :	3 :	12	·07 =	0 :	6 :	43·2	·007 =	40·32
·8 =	9 :	4 :	48	·08 =	0 :	7 :	40·8	·008 =	46·08
·9 =	10 :	6 :	24	·09 =	0 :	8 :	38·4	·009 =	51·08

No. VI.

TABLE *showing the Correspondence between the new French and the English Weights and Measures.*

I. MEASURES OF LENGTH.

The metre being at 32°, and the foot at 62°

		English Inches.		Miles.	fur.	English yds.	ft.	in.
Millimetre	=	·03937						
Centimetre	=	·39371						
Decimetre	=	3·93710						
Metre	=	39·37100	=	0	0	1	0	3·7
Decametre	=	393·71000	=	0	0	10	2	9·7
Hecatometre	=	3937·10000	=	0	0	109	1	1
Kilometre	=	39371·00000	=	0	4	213	1	10·2
Myriametre	=	393710·00000	=	6	1	156	0	6

II. MEASURES OF CAPACITY.

		Cubic Inches.		Tons.	hogs.	English. wine gals.	pints.
Millilitre	=	·06103					
Centilitre	=	·61028					
Decilitre	=	6·10280					
Litre	=	61·02800	=	0	0	0	2·1138
Decalitre	=	610·28000	=	0	0	2	5·1352
Hecatolitre	=	6102·80000	=	0	0	26·419	
Kilolitre	=	61028·00000	=	1	0	12·19	
Myrialitre	=	610280·00000	=	10	1	58·9	

III. MEASURES OF WEIGHT.

		English Grains.		Troy. lbs.	oz.	dr.	grs.
Milligramme	=	·0154					
Centigramme	=	·1544					
Decigramme	=	1·5444					
Gramme	=	15·4440					
Decagramme	=	154·4402	=	0	0	2	3·44
Hecatogramme	=	1544·4023	=	0	3	0	44
Kilogramme	=	15444·0234	=	2	8	1	24
Myriagramme	=	154440·2344	=	26	9	6	0

Gram.		Troy grs.	Deca-gram.		Troy dr.		grs.	Hecto-gram.		Troy oz.		Avoird. oz.
1	=	15·444	1	=	2	:	34·44	1	=	3·2175	=	3·5279
2	=	30·888	2	=	5	:	8·88	2	=	6·4350	=	7·0558
3	=	46·332	3	=	7	:	43·32	3	=	9 6525	=	10·5837
4	=	61·776	4	=	10	:	17·76	4	=	12·8700	=	14·1116
5	=	77·220	5	=	12	:	52·20	5	=	16·0875	=	17·6395
6	=	92·664	6	=	15	:	26·64	6	=	19·3050	=	21·1674
7	=	108·108	7	=	18	:	1·08	7	=	22·5295	=	24·6953
8	=	123·552	8	=	20	:	35·52	8	=	25·7400	=	28·2232
9	=	138·996	9	=	23	:	9·96	9	=	28·9575	=	31·7511

No. VII.

TABLE *of the Solubility of Pharmaceutical Salts in* 100 *Parts Water, at*

ACIDS	60°	212°
Arsenious	1·25	6
Benzoic	0·208	4·17
Boracic	2·8	8
Citric (*Vauquelin*)	133	200
Gallic	8·3	66
Oxalic	50	100
Phosphoric	20	much more.
Tartaric	very soluble.	

SALIFIABLE BASES.	60°	212°
Potassa (pure)	41	56·5
Soda (pure)	more soluble than Potassa.	
Baryta (crystallized) . . .	57	watery fusion.
Strontia (crystallized) . .	19·2	50
Lime (*Dr. Dalton*, at 32° 0·15; 130° 103;)	0·1287	0·0789
Magnesia (*Dr. Fyfe*) . .	0·0194	0·00277

SALTS.		60°	212°
Alum, potash (*Dr. F. Thomson*) . . .		14·79	133
—— soda (*ditto*)		327·6	
Ammonia, acetate		very soluble.	
—— carbonate			
—— bicarbonate		decomposed.	
—— sesquicarbonate		50	100
—— hydro-chlorate		33	100
—— phosphate		15	25
—— sulphate		50	100
Antimony (tartar emetic)	D.	6·6	33
Barium (chloride)		34	59
Baryta, acetate		very soluble.	
—— chlorate		25	+
—— nitrate		8	25
Copper, acetate		very soluble.	
—— sulphate		25	50
Lead, acetate		25	+
Iron, sulphate		50	130
—— muriate		very soluble.	
Calcium, chloride		400	+
Lime, sulphate		0·2	0·22
Magnesia, acetate		very soluble.	
—— carbonate		0·04	0·0111
—— sulphate		100	644
Mercury, bichloride		5	33
Potassa, acetate		100	
—— carbonate		100+	
—— bicarbonate		25	decomposed.
—— ferrocyanate		33	100
—— hydrocyanate		very soluble.	
—— iodate		7·5	
—— hydriodate		very soluble.	
—— sulphate		6·25	20
—— bisulphate		50	100+
—— bitartrate		1·6	3·3
—— tartrate		25	
Silver, nitrate		100	
Sodium, chloride		35·42	40

Soda, carbonate	50	100+
—— bicarbonate	much less.	decomposed.
—— bi borate (*borax*)	5	16·8
—— ——— with bi-tartrate of Potassa	20	+
—— phosphate	25	50
—— sulphate	37	125
—— bisulphate	50	
Zinc, sulphate	40	+

No. VIII.

TABLE *showing the Correspondence of English Weights and Measures with those of Holland, Sweden, and Germany.*

The English Ale Gallon contains 282 cubic inches; the Wine Gallon, 231 cubic inches.

I. DUTCH.

1 lb. Dutch = 1 lb. 3 oz. 16 dwt. 7 grs. Troy.
$787\frac{1}{2}$ lbs. Dutch = 1038 lbs. Troy.

II. SWEDISH.

1 kanne of water Swedish = 48088·719444 grs. Troy, in weight; and 189·9413 English cubic inches.
1 lb. Swedish = 6556 grs. Troy.

III. GERMAN.

74 lbs. German Apothecaries' weight = 74 lbs. Troy.
1 oz. Nuremberg medic. weight = 7 dr. 2 dwt. 9 grs. Troy.
1 mark Cologne = 7 oz. 2 dwt. 4 grs. Troy.

No. IX.

Table in which the Specific Gravity is compared with the Degrees of Baumé's Hydrometer.

For Fluids lighter than Water.

Degree of Areometer.	Specific Gravity. By Baumé.	Specific Gravity. In Pharm. Batav.	Specific Gravity. By Beck.	Degree of Areometer.	Specific Gravity. By Baumé.	Specific Gravity. In Pharm. Batav.	Specific Gravity. By Beck.
0		1000	1.0000	32	0.8638	819	0.8415
1		993	0.9941	33	0.8584	814	0.8374
2		987	0.9883	34	0.8531	810	0.8333
3		980	0.9826	35	0.8479	805	0.8292
4		974	0.9770	36	0.8428	800	0.8252
5		967	0.9714	37	0.8378	796	0.8212
6		961	0.9659	38	0.8329	792	0.8173
7		954	0.9604	39	0.8281	787	0.8133
8		948	0.9550	40	0.8233	782	0.8095
9		941	0.9497	41	0.8186	778	0.8056
10	1.0000	935	0.9444	42	0.8139	774	0.8018
11	0.9930	929	0.9392	43	0.8093	770	0.7981
12	0.9861	923	0.9340	44	0.8047	766	0.7943
13	0.9792	917	0.9289	45	0.8001	762	0.7906
14	0.9724	911	0.9239	46	0.7956	758	
15	0.9657	906	0.9189	47	0.7911	754	
16	0.9591	900	0.9139	48	0.7866	750	
17	0.9526	895	0.9090	49	0.7821	746	
18	0.9462	889	0.9042	50	0.7777	742	
19	0.9399	884	0.8994	51	0.7733		
20	0.9336	878	0.8947	52	0.7689		
21	0.9274	873	0.8900	53	0.7646		
22	0.9212	868	0.8854	54	0.7603		
23	0.9151	863	0.8808	55	0.7560		
24	0.9091	858	0.8762	56	0.7518		
25	0.9032	853	0.8717	57	0.7476	712?	
26	0.8974	847	0.8673	58	0.7435		
27	0.8917	842	0.8629	59	0.7394		
28	0.8860	837	0.8585	60	0.7354		
29	0.8804	832	0.8542	61	0.7314		
30	0.8748	828	0.8500	62	0.7251		
31	0.8693	823	0.8457				

Comparative Scale of Baumé's Hydrometer with Sp. Gr.

For Fluids heavier than Water.

Degree of Areometer.	Specific Gravity. By Baumé.	Specific Gravity. In Pharm. Batav.	Specific Gravity. By Beck.	Degree of Areometer.	Specific Gravity. By Baumé.	Specific Gravity. In Pharm. Batav.	Specific Gravity. By Beck.
0	1.0000	1000	1.0000	41	1.3947	1398	1.3178
1	1.0070	1007	1.0059	42	1.4082	1412	1.3281
2	1.0141	1014	1.0119	43	1.4219	1426	1.3386
3	1.0213	1022	1.0180	44	1.4359	1440	1.3492
4	1.0286	1029	1.0241	45	1.4501	1454	1.3600
5	1.0360	1036	1.0303	46	1.4645	1470	1.3710
6	1.0435	1044	1.0366	47	1.4792	1485	1.3821
7	1.0511	1052	1.0429	48	1.4942	1501	1.3934
8	1.0588	1060	1.0494	49	1.5096	1516	1.4050
9	1.0666	1067	1.0559	50	1.5253	1532	1.4167
10	1.0745	1075	1.0625	51	1.5413	1549	1.4286
11	1.0825	1083	1.0692	52	1.5576	1566	1.4407
12	1 0906	1091	1.0759	53	1.5742	1583	1.4530
13	1.0988	1100	1.0828	54	1.5912	1601	1.4655
14	1.1071	1108	1.0897	55	1.6086	1618	1.4783
15	1.1155	1116	1.0968	56	1.6264	1637	1.4912
16	1.1240	1125	1.1039	57	1.6446	1656	1.5044
17	1.1326	1134	1.1111	58	1.6632	1676	1.5179
18	1.1414	1143	1.1184	59	1.6323	1695	1.5315
19	1.1504	1152	1.1258	60	1.7019	1715	1.5454
20	1.1596	1161	1.1333	61	1.7220	1736	1.5596
21	1.1690	1171	1.1409	62	1.7427	1758	1.5741
22	1.1785	1180	1.1486	63	1.7640	1779	1.5888
23	1.1882	1190	1.1565	64	1.7858	1801	1.6038
24	1.1981	1199	1.1644	65	1.8082	1823	1.6190
25	1.2082	1210	1.1724	66	1.8312	1847	1.6346
26	1.2184	1221	1.1806	67	1.8548	1872	1.6505
27	1.2288	1231	1.1888	68	1.8790	1897	1.6667
28	1.2394	1242	1.1972	69	1.9038	1921	1.6832
29	1.2502	1252	1.2057	70	1.9291	1946	1.7000
30	1.2612	1261	1.2143	71	1.9548	1974	1.7172
31	1.2724	1275	1.2230	72	1.9809	2020	1.7347
32	1.2838	1286	1.2319	73	1.0073	2031	1.7526
33	1.2954	1298	1.2409	74	1.0340	2054	1.7708
34	1.3072	1309	1.2500	75	1.0610	2087	1.7895
35	1.3190	1321	1.2593	76		2116	1.8085
36	1.3311	1334	1.2687	77			1.8280
37	1.3434	1346	1.2782	78			1.8478
38	1.3559	1359	1.2879	79			1.8681
39	1.3686	1372	1.2977	80			1.8889
40	1.3815	1384	1.3077				

No. X.

Terms employed in Prescriptions.

Congius,	c, a gallon.	*Libra,*	℔, a pound.
Octarius,	o, a pint.	*Uncia,*	℥j, an ounce.
Fluid uncia,	f℥j., $\frac{1}{20}$ of a pint.	*Drachma,*	ʒj, drachm.
Fluid drachma,	fʒj., $\frac{1}{160}$ of a pint.	*Scrupulus,*	℈ j., a scruple.
Minimum,	♏, $\frac{1}{9600}$ of a pint.	*Granum,*	gr., a grain.

Cyathus, a wineglass, = f℥j ss. of any aqueous infusion, decoction, or mixture.

Poculum, a teacup, = f℥iv.

Cochleare majus, a table spoonful, = fʒiv. of aqueous fluids = fʒiij. of alcoholic.

Cochleare minimum, a tea-spoonful, = fʒss. of aqueous fluids: = ♏xx. of alcoholic: = ʒj. to ʒij. of conserves: = ℈ss. to ℈j. of light powders: = ʒss. to ℈ij. of heavy, not metallic: = ʒj. to ℈iv. of metallic.

Manipulus, a handful.

Pugillus, a pinch, lifted between the thumb and the fore and second finger.

No. XI.

CLASSIFICATION OF MATERIA MEDICA.

CLASSES.

i. INORGANICA.
ii. ORGANICA—vel eorum productiones.

CLASSIS I.—INORGANICA.

Sub-classis 1. CALORICUS—utitur in forma
a. Aeris calidæ.
b. Balnei calidi.
c. —— tepidi.
d. —— vaporis.
e. Fomentorum.
f. Cataplasmatorum.
g. Cauteriorum.

2. ELECTRICITAS.

Var. Galvanismus.

3. GASEA.

a. Gas Oxygenium.
b. —— Hydrogenium.
c. —— Nitrogenium.

d. Chlorinum.
e. Gas Acidum Carbonicum.
f. —— Hydrogenium carburetum.
g. Ammonia.

4. PHOSPHORUS.

5. SULPHUR—in forma
a. Sulphuris sublimati.
b. ——— præcipitati.
c. Hydrosulphureti Ammoniæ.

6. IODINIUM—et ejusdem compositi.
a. Sulphuris Iodidum.
b. Metallorum Iodidi.
c. Potassæ Iodidum.

7. CARBO—in forma
a. Ligni Carbonis.

8. BITUMEN.

Var. *a.* Naphtha.
b. Petroleum.
Sub-var. *Pix Barbadensis.*

9. ACIDA—sunt
a. Acidum Sulphuricum.
b. ——— Nitricum.
Var. ——— Nitrosum.
c. ——— Hydrochloricum.
Var. ——— Nitro-hydrochloricum.
d. ——— Carbonicum.
e. ——— Aceticum.
f. ——— Oxalicum.
g. ——— Tartaricum.
h. ——— Citricum.
i. ——— Benzoicum.
k. ——— Phosphoricum.
l. ——— Hydrocyanicum.
m. ——— Gallicum.
n. ——— Tannicum.

10. METALLICA—et eorum Sales.

1. POTASSIUM.
a. Potassii Sulphuretum.
b. ——— Cyanidum.
c. ——— Iodidum.
d. ——— Bromidum.
e. Potassa.
Var. Potassæ Hydras.
α. Potassæ Carbonas.
β. ——— Bicarbonas.
γ. ——— Sulphas.

δ. Potassæ Bisulphas.
ε. ——— Nitras.
ζ. ——— Chloras.
η. ——— Acetas.
θ. ——— Tartras.
ι. ——— Bitartras.
κ. ——— Citras.
λ. ——— Binoxalas.

2. SODIUM.

a. Sodii Chloridum.
b. Soda.
α. Sodæ Carbonas.
β. ——— Sesquicarbonas.
γ. ——— Sulphas.
δ. ——— Phosphas.
ε. ——— Biboras.
ζ. ——— et Potassio-Tartras.
η. ——— Chloridum.

3. CALCIUM.

a. Calcii Chloridum.
b. Calx.
α. Calx Chlorinata.
β. Calcis Carbonas.
γ. ——— Phosphas.

4. BARIUM.

a. Barii Chloridum.
b. Baryta.

5. MAGNESIUM.

a. Magnesia.
α. Magnesiæ Carbonas.
β. ——— Bicarbonas.
γ. ——— Sulphas.
δ. ——— Citras.

6. ARGENTUM.

a. Argenti (*Oxidi*) Nitras.
b. ——— Cyanidum.

7. HYDRARGYRUM.

a. Hydrargyri Oxidi.
α. Oxidum per aerem et caloricum *(Binoxidum)*.
β. ——— trituratĭonem.
γ. ——— Nitricum Acidum *(Nitrico Oxidum)*.
δ. ——— præcipitationem.
b. Hydrargyri Chloridi.
α. Hydrargyri Chloridum *(Calomelas)*.
β. ——— Bichloridum.
γ. ——— Ammonio-Chloridum.

c. Hydrargyri Iodidum.
d. ———— Biniodidum.
e. ———— Sulphuretum cum Sulphure.
f. ———— Bisulphuretum.
g. ———— Bicyanidum.
h. ———— Persulphas.
i. ———— Acetas.

8. FERRUM.

a. Ferri Sulphuretum.
b. —— Iodidum.
c. —— Oxidi—per
 α. aerem et caloricum (*Sesquioxidum*).
 β. aerem et aquam (*rubigo*).
 γ. decompositionem (*O. rubrum*).
d. Ferri Sulphas.
e. —— Hydrochlorium.
f. —— Ammonio-Chloridum.
h. —— Acetas.
i. —— Potassio Tartras.

9. CUPRUM.

a. Cupri Ammonio-Sulphas.
b. —— Sulphas.

10. PLUMBUM.

a. Plumbi Oxidum, *var.*—Hydratum.
b. ——— Iodidum.
c. ——— Oxidum semivitrum.
d. ——— Carbonas.
e. ——— Diacetas.
f. ——— Acetas.
g. ——— Chloridum.

11. ZINCUM.

a. Zinci Oxidum.
b. —— Carbonas.
c. —— Sulphas.
d. —— Acetas.

12. BISMUTHUM.

a. Bismuthi Iodidum.
b. ——— Trisnitras.

13. ANTIMONIUM.

a. Antimonii Sesquisulphuretum.
 α. Antimonii Oxysulphuretum.
b. Antimonii Oxidi.
 α. Antimonii Protoxidum.
 β. ———— Peroxidum (*Ox. nitro-muriaticum*).
 γ. ———— Oxidum cum phosphate calcis (*Pulvis Antimonii Compositus; Pulvis Jacobi verus*).

c. Antimonii Potassio-Tartras.
  α. Vinum Antimonii Potassio-Tartratis.

14. ARSENICUM.

a. Arseniosum acidum (*Arsenici Oxydum subl.* D. *Arsenicum album subl.* L.)
b. Arsenis Potassæ (*Liq. Arsenitis Potassæ*, L. *Solutio Arsenicalis*, E.)

11. SALES non METALLICA :

a. Ammoniæ Hydrochloras.
b. ——— Sesquicarbonas.
c. ——— Carbonas.
d. ——— Acetas.
e. ——— Citras.

12. AQUÆ.

a. Aqua communis.
b. —— Marina.
c. Aquæ Distillatæ.
d. —— Minerales:
  α. —— aeratæ.
  β. —— salinæ.
  γ. —— ferrugineæ.
  δ. —— sulphureæ.

13. ALCOHOL.

a. Spiritus distillati.
b. Tincturæ.
c. Vini.

14. ÆTHEREA.

a. Æther Sulphuricus.
  α. Æther rectificatus.
  β. ——————— cum Alcohole (*Liquor Ætheri Sulphuricus*, D.)
b. Oleum Æthereum.
  α. Ætheris Sulphurici Spiritus comp. L. (*Liq. Æthereus oleosus*, D.)
c. Æther nitrosus.
  α. Spiritus Ætheris Nitrici, L. E. D.

CLASSIS II.—ORGANICA, et eorum productiones.

§ *Plantæ.*

VASCULARES.

Class i. EXOGENÆ vel DICOTYLEDONEÆ.

Sub-class i. POLYPETALÆ.

Group 1. *Albuminosæ.*

Order i. Ranunculaceæ.

* *Principium acre—Excitans.*

1. Ranunculus *acris.*
2. ——————*flammula.*
3. Delphinium *Staphisagria.*
4. Helleborus *Officinalis.*

* * *Aconitina—Narcotica.*

5. Aconitum *paniculatum.*

Order ii. Papaveraceæ.

* *Morphiæ Bimeconas—Narcotica.*

1. Papaver *somniferum.*
2. ——— *Rhœas.*

Order vi. Myristaceæ.

* *Oleum volatile—Excitans.*

1. Myristica *moschata.*

Order xi. Umbelliferæ.

* *Oleum volatile—Excitans.*

1. Anethum *Fœniculum.*
2. ——— *Graveolens.*
3. Daucus *carota.*
4. Carum *Carui.*
5. Coriandrum *Sativum.*
6. Pimpinella *Anisum.*

* * *Gummi Resinæ cum oleo—Excitans.*

7. Galbanum *officinale.*
8. Ferula *Assafœtida.*
9. Opoponax *Chironium.*
10. Dorema *Ammoniacum.*
11. Cuminum *Cyminum.*

* * * *Conia—Narcotica.*

12. Conium *maculatum.*

Order xvii. Vitaceæ.

* *Saccharum—Mucilago—Demulcens.*

1. Vites *vinifera.*

Group 2. *Epigynosæ.*

Order xxviii. Myrtaceæ.

* *Oleum volatile—Excitans.*

1. Melaleuca *Minor.*
2. Eugenia caryophyllata.
3. ——— pimenta.

* * *Tanninum—Astringens.*

4. Eucalyptus *resinifera.*
5. Punica *Granatum.*

ORDER XXXIV. CUCURBITACEÆ.

* *Colocyntina—Cathartica.*

1. Cucumis *Colocynthis.*

** *Elatina—Cathartica.*

2. Momordica *Elaterium.*

Group 3. *Parietosæ.*

ORDER XL. CRUCIFERÆ.

* *Principium acre—Excitans.*

1. Cardamine *pratensis.*
2. Sinapis *Nigra.*
3. Cochlearia *Armoracea.*

Group 4. *Calycosæ.*

ORDER LIV. GUTTIFERÆ.

* *Gummi Resina—Catharticum.*

1. Stalagmitis *Cambogioides.*

ORDER LXII. POLYGALACEÆ.

* *Principium acre—Diureticum.*

1. Polygala *senega.*

* *Acidum Tannicum—Astringens.*

2. Krameria *triandra.*

ORDER LXV. LINACEÆ.

* *Mucilago—Demulcens.*

1. Linum *usitatissimum.*

Group 5. *Syncarposæ.*

ORDER LXXI. MALVACEÆ.

** *Mucilago—Demulcens.*

1. Althæa *officinalis.*

ORDER LXXIII. DIPTERACEÆ.

* *Camphora—Excitans.*

1. Dryabalanops *Camphora.*

ORDER LXXVI. MELIACEÆ.

* *Oleum volatile—Excitans.*

1. Canella *alba.*

ORDER LXXVII. CEDRELACEÆ.

* *Acidum Tannicum—Astringens.*

1. Swietenia *Mahagoni.*

ORDER LXXIX. AURANTIACEÆ.

* *Acidum Citricum—Refrigerans.*

1. Citrus *aurantium.*
2. —— *medica.*

ORDER LXXXI. RHAMNACEÆ.

* *Principium acre—Catharticum.*

1. Rhamnus *catharticus.*

ORDER LXXXV. BURSARACEÆ.

* *Gummi resina—Excitans.*

1. Boswellia *serrata.*
2. Balsamidendron *Gileadense.*
3. ——————— *Myrrha.*

ORDER LXXXVI. EUPHORBIACEÆ.

* *Oleum volatile—Excitans.*

1. Croton *Cascarilla.*

* * *Principium acre—Errhinum, Catharticum.*

2. Euphorbia *officinarum.*
3. ———— *Canariensis.*
4. Ricinis *communis.*
5. Croton *Tiglium.*

Group 6. *Gynobaseosæ.*

ORDER XCIX. SIMARUBACEÆ.

1. Quassia *excelsa.*
2. ——— Simaruba *officinalis.*

ORDER C. RUTACEÆ.

* *Oleum volatile—Excitans.*

1. Ruta *graveolens.*

ORDER CI. ZYGOPHYLLACEÆ.

* *Guaiacum—Sudorificum.*

1. Guaiacum *officinale.*

ORDER CV. OXALIDACEÆ.

* *Acidum oxalicum—Refrigerans.*

1. Oxalis *acetosella.*

ORDER CIX. ROSACEÆ.

* *Tanninum—Acidum Gallicum—Astringens.*

1. Geum *urbanum.*
2. Tormentilla *erecta.*
3. Rosa *Canina.*
4. —— *centifolia.*
5. —— *Gallica.*

Sub-ord. POMACEÆ.

* *Mucilago—Demulcens.*

1. Pyrus *Cydonia.*

Sub ord. AMYGDALEÆ.

* *Oleum fixum—Saccharum—Demulcens, Aperien.*

1. Amygdalus *communis,*—var. *dulcis.*
2. Prunus *domestica.*

** *Acidum Hydrocyanicum—Sedativum.*

3. Amygdalus *communis,*—var. *amara.*
4. ———— *Persica.*
5. Prunus *Lauro-cerasus.*

*** *Acidum Gallicum—Astringens.*

6. Prunus *spinosa.*

ORDER CX. LEGUMINOSÆ.

* *Principium saccharinum—Demulcens.*

1. Glycyrrhiza *glabra.*

** *Mucilago, Cerassina—Demulcens.*

2. Acacia *vera.*
3. Astragalus *Tragacantha.*

*** *Principium acre—Catharticum.*

4. Cassia *fistula.*
5. Geoffrœa *inermis.*

**** *Cathartinum—Catharticum.*

6. Cassia *senna.*

**** *Oleum volatile—Excitans.*

7. Copaifera *officinalis.*
8. Myroxylon *Peruiferum.*

***** *Acidum Tannicum—Astringens.*

9. Hæmatoxylon *Campechianum.*
10. Pterocarpus *Draco.*
11. Acacia *Catechu.*

***** *Acidum Tartaricum—Refrigerans.*

12. Tamarindus *Indica.*

****** *Setæ—Excitans.*

13. Mucuna *pruriens.*

ORDER CXV. DIOSMEÆ.

* *Cinchonia ?—Tonica.*

1. Cusparia *febrifuga.*

** *Oleum volatile—Diureticum.*

2. Diosma *crenata.*

ORDER CXIX. ANACARDACEÆ.

* *Oleum volatile—Sudorificum.*

1. Rhus *Toxicodendron.*
2. Pistacia *Lenticus.*

Sub-class 2. INCOMPLETÆ.

Group 1. *Rutembryosæ.*

ORDER CXX. CUPULIFERÆ.

* *Acidum Tannicum—Acidum Gallicum—Astringens.*

1. Quercus *Robur.*
2. ——— *Infectoria.*
3. ——— *pedunculata.*

ORDER CXXVI. URTICACEÆ.

* *Principium amarum.*

1. Humulus *Lupulus.*

ORDER CXXVII. ULMACEÆ.

* *Ulminum—Diureticum.*

1. Ulmus *Campestris.*

Group 2. *Achlampdosæ.*

ORDER CXXXVI. PIPERACEÆ.

* *Piperina—Tonica.*

1. Piper *nigrum.*
2. —— *longum.*

** *Oleum volatile—Diureticum.*

3. Piper *Cubeba.*

ORDER CXXXVII. SALICACEÆ.

* *Salicina—Tonica.*

1. Salix *fragilis.*
2. —— *alba.*
3. —— *Caprea.*

ORDER CXXXVIII. FICOIDEÆ.

* *Saccharum—Mucilago—Demulcens.*

1. Ficus *Carica.*
2. Morus *nigra.*

** *Principium acre—Sudorificum.*

3. Dorstenia *Contrayerva.*

Group 3. *Tubiferosæ.*

ORDER CXLVI. THYMALACEÆ.

* *Principium acre—Epispasticum, Sudorificum.*

1. Daphne *Mezereum*

ORDER CL. LAURACEÆ.

* *Oleum volatile—Excitans.*

1. Laurus *Cinnamomum.*
2. ——— *Cassia.*
3. ——— *Nobilis.*
4. ——— *Sassafras.*

** *Camphora—Excitans.*

5. Laurus *Camphora.*

Group 4. *Columnosæ.*

ORDER CLV. ARISTOLOCHIACEÆ.

* *Principium amarum—Tonicum.*

1. Aristolochia *serpentaria.*

** *Cytissinum—Errhinum.*

2. Asarum *Europœum.*

Group. 5. *Curvembryosæ.*

ORDER CLX. POLYGONACEÆ.

* *Acidum Tannicum—Astringens.*

1. Polygonum *Bistorta.*

** *Acidum Oxalicum—Refrigerans.*

2. Rumex *Acetosa.*

*** *Principium catharticum.*

3. Rumex *aquaticus.*
4. ——— *obtusifolius.*
5. Rheum *palmatum.*
6. ——— *undulatum.*
7. ——— *Enodi.*

ORDER CLXIV. MENISPERMACEÆ.

* *Principium narcoticum.*

1. Cocculus *suberosus.*

** *Calumbina—Tonica.*

2. Cocculus *palmatum.*

Sub-class 3. MONOPETALÆ.

Group 1. *Polycarposæ.*

ORDER CLXVI. PYROLACEÆ.

* *Principium amarum—Diureticum.*

1. Chimaphila *Umbellata.*

ORDER CLXVIII. ERICACEÆ.

* *Principium acre—Sudorificum.*

1. Rhododendron *crysanthum.*

** *Acidum Gallicum—Diureticum.*

2. Arbutus *Uva-Ursi.*

ORDER CLXXIV. EBENACEÆ.

Sub-ord. STYRACÆ.

* *Gummi Resina—Excitans.*

1. Styrax *officinale.*

** *Acidum Benzoicum—Excitans.*

2. Styrax *Benzoin.*

ORDER CLXXVII. CONVOLVULACEÆ.

* *Principium Catharticum.*

1. Convolvulus *Scammonea.*
2. Ipomæa *Jalapa.*

Group 2. *Epigynosæ.*

ORDER CLXXXII. LOBELIACEÆ.

* *Principium emeticum—Sudorificum.*

1. Lobelia *inflata.*

ORDER CLXXXVI. COMPOSITÆ.

* *Oleum volatile—Piperina—Excitans.*

1. Anthemis *nobilis.*

** *Principium acre—Excitans.*

2. Anthemis *Pyrethrum.*
3. Arnica *montana.*
4. Artemisia *Absinthium.*
5. ——— *Chinensis.*
6. ——— *Indica.*
7. ——— *santonica.*

*** *Principium Amarum—Tonicum, Diureticum.*

8. Tannacetum *vulgare.*
9. Leontodon *Taraxicum.*
10. Tussilago *Farfara.*
11. Inula *Helenium.*

**** *Principium Narcoticum.*

12. Lactuca *virosa.*
13. ——— *sativa.*

ORDER CLXXXIX. CINCHONACEÆ.

* *Emetina—Emetica.*

1. Cephaëlis *Ipecacuanha.*

** *Tanninum—Astringens.*

2. Nauclea *Gambeer.*

*** *Cinchonia—Tonica.*

3. Cinchona *lancifolia.*

**** *Quinia—Tonica.*

4. Cinchona *Cordifolia.*

***** *Cinchonia, Quinia—Tonica.*

5. Cinchona *oblongifolia.*

ORDER CXCI. CAPRIFOLIACEÆ.

* *Principium acre—Laxativum.*

1. Sambucus *nigra.*

Group 3. *Aggregosæ.*

ORDER CXCIX. VALERIANACEÆ.

* *Oleum volatile—Excitans.*

1. Valeriana *officinalis.*

Group 4. *Nucamentosæ.*

ORDER CCIX. LABIATÆ.

* *Oleum Volatile—Excitans.*

1. Hyssopus *officinalis.*
2. Lavandula *spica.*
3. Mellissa *officinalis.*
4. Marrubium *vulgare.*
5. Mentha *piperita.*
6. ——— *sativa.*
7. ——— *pulegium.*
8. Origanum *Marjorana.*
9. ———— *vulgare.*
10. Rosmarinus *officinalis.*
11. Salvia *officinalis.*

Group 5. *Dicarposæ.*

ORDER CCXXI. SCROPHULARIACEÆ.

* * *Digitalina—Diuretica.*

1. Digitalis *purpurea.*

ORDER CCXXII. SOLANACEÆ.

* *Atropina—Narcotica.*

1. Atropa *Belladonna.*

* * *Daturia—Narcotica.*

2. Datura *Strammonium.*

* * * *Hyoscyamia—Narcotica.*

3. Hyosciamus *niger.*

* * * * *Nicotina—Narcotica.*

4. Nicotiana *Tabacum.*

* * * * * *Solanina—Diuretica.*

5. Solanum *Dulcamara.*

* * * * * * *Principium acre—Excitans.*

6. Capsicum *annum.*
7. Verbascum *Thapsus.*

ORDER CCXXIV. GENTIANACEÆ.

* *Principium amarum—Tonicum.*

1. Gentiana *Lutea.*
2. Menyanthes *trifoliata.*

ORDER CCXXV. SPIGELIACEÆ.

* *Principium Catharticum.*

1. Spigelia *Marilandica.*

ORDER CCXXVI. APOCYNACEÆ.

* *Strychnia—Excitans.*

1. Strychnos *Nux Vomica.*
2. ——— *St. Ignatius.*

ORDER CCXXX. OLEACEÆ.

* *Oleum fixum—Demulcens.*

1. Olea *Europæa.*

* * *Mannita—Aperiens.*

2. Fraxinus *ornus.*

Class ii. GYMNOSPERMÆ.

ORDER CCXXXIV. CONIFERÆ.

* *Terebinthus—Excitans, Diureticus.*

1. Pinus *Abies.*
2. —— *Sylvestris.*
3. —— *Balsamea.*
4. —— *Larix.*
5. Juniperus *communis.*
6. ——— *Sabina.*
7. ——— *Lycia.*

Class iii. ENDOGENÆ vel MONOCOTYLEDONE.

Group 1. *Epigynosæ.*

ORDER CCXXXVII. SCITAMINEÆ.

* *Oleum acre—Excitans.*

1. Zinziber *officinale.*
2. Elettaria *Cardamomum.*
3. Curcuma *longa.*

ORDER CCXLIV. IRIDACEÆ.

* * *Oleum volatile—Excitans.*

1. Crocus *Sativus.*

Group 3. *Hypogynosæ.*

ORDER CCLII. MELANTHACEÆ.

* *Veratria—Cathartica, Narcotica.*

1. Colchicum *autumnale.*
2. Veratrum *album.*

ORDER CCLIV. LILIACEÆ.

* *Principium acre—Diureticum, Expectorans.*

1. Allium *Sativum.*
2. ——— *Porrum.*
3. Scilla *Maritima.*

* * *Resina-amara—Catharticum.*

4. Aloë *spicata.*

Group 4. *Retosæ.*

ORDER CCLX. SMILACEÆ.

* *Principium ignotum.*

1. Smilax *Sarsaparilla.*
2. —— *Aspera.*

Group 5. *Spadicosæ.*

ORDER CCLXVI. ACORACEÆ.

* *Oleum volatile—Excitans.*

1. Acorus *Calamus.*

Group 6. *Glumoceæ.*

ORDER CCLXXI. GRAMINACEÆ.

* *Amylum.*

1. Avena *Sativa.*
2. Hordeum *distichon.*
3. Triticum *hybernum.*

* * *Saccharum.*

4. Saccharum *officinarum.*

Class v. ACROGENÆ.

ORDER CCLXXX. POLYPODACEÆ.

* *Principium acre—Excitans.*

1. Aspidium *filix mas.*

ORDER CCXCIII. FUNGACEÆ.

1. Boletus *ignarius.*
2. Acinula *Clavus.*

ORDER CCXCIV. LICHENACEÆ.

* *Principium amarum—Tonicum.*

1. Cetraria *Islandica.*
2. Rocella *tinctoria.*

ORDER CCXCV. ALGACEÆ.

1. Fucus *vesiculosus.*

§ § *Animalia.*

A. VERTEBRATA.

Class i. MAMMIFERA.

ORDER V. RODENTIA.

* *Castoreum Excitans.*

1. Castor *fiber.*

* * *Axungia—Demulcens.*

2. Sus *Scrofa.*

ORDER VIII. RUMINANTIA.

* *Moschus—Excitans.*

1. Moschus *moschiferus.*

* * *Cornu—Demulcens.*

2. Cervus *elaphas.*

ORDER IX. CETACEA.

* *Spermaceti—Demulcens.*

1 Physeter *macrocephalus.*

Class ii. AVES.

ORDER VI. GALLINACEÆ.

* *Ova.*

1. Phasianus *gallus.*

C. ARTICULATA.

Class i. ANNELIDA.

1. Hirudo *medicinalis.*

Class ii. CRUSTACEA.

* *Concreti seu lappilli.*

1. Astacus *fluviatilis.*

Class iv. INSECTA.

ORDER V. COLEOPTERÆ.

* *Canthariden—Vesicantia.*

1. Cantharis *vesicatoria.*
2. Mylabris *variabilis.*

ORDER XII. DIPTERÆ.

* *Mel, Cera—Demulcens.*

1. Apis *mellifica.*

* * *Principium colorans.*

2. Coccus *cacti.*

D. RADIATA.

Class iv. POLYPI.

* *Iodinium—Excitans.*

1. Spongia *officinalis.*

PART II.

MATERIA MEDICA.

MATERIA MEDICA is that department of the science of medicine, that treats of the nature and properties of the substances that are employed as remedies to restore health in diseased bodies.

According to this definition, it should comprehend every remedy, whether it be a simple, the production of nature; or a compound artificially prepared by the pharmacopolist; or even an affection of the mind: but the British Colleges of Physicians confine the application of the term, in their pharmacopœias, to those remedies only which are simples, and such compounds as are articles of general commerce, or over the preparation of which they have no control. These pharmacopœias differ also from the works of the generality of systematic writers on Materia Medica, in arranging the substances alphabetically, without any regard to their affinities as natural objects, or to their medicinal virtues. This mode, although it be not so scientific, yet is much less liable to objection than many of the other modes that have been occasionally adopted; as the best of these have been, generally, too much modified by the prevailing theoretical doctrines of the day, which, unfortunately for medical science, have hitherto had too slight a foundation on truth to secure their permanence. The plan of the pharmacopœias has consequently been judiciously followed by the compilers of Dispensatories: and the convenience and utility of it is so generally acknowledged, that we the more readily comply with our own opinion of its propriety in adopting it.

This part of our work, therefore, contains the lists of the materia medica of the pharmacopœias issued by the London, the Edinburgh, and the Dublin Colleges; and subjoined to the name of each of the substances supplied by the vegetable and the animal kingdoms, a description of the plant or the animal which yields the remedy is given in the language and after the method of Natural History. The chymical characters, as far as they are known, of these matters are also stated; and the analysis of such remedies as are more immediately the objects of chymical investigation, with the medical properties and uses of all of them, are detailed; so as to afford every useful information regarding them, in a form the most convenient for practical reference.

ABIETIS RESINA. Vide *Pinus Abies.*
ABSINTHIUM. Vide *Artemisia Absinthium.*

ACACIA. *Spec. Plant. Willd.* iv. 1085.

Cl. 23. *Ord.* 1. Polygamia, Monœcia. *Nat. ord.* Leguminosæ.

G. 1902. *Hermaph. Calyx* five-toothed. *Corolla* five-cleft, or formed of five petals. Stamens 4-100. *Pistil.* 1. *Legume* bivalve. *Male Cal.* five-toothed. *Cor.* five-cleft, or formed of five petals. *Stam.* 4-100.

**** *Leaves bipinnate, stipular thorns or prickles, elongated spikes.*

Species 73. Acacia *Catechu.*[1] Catechu. *Med. Bot. 3d edit. t.* 157.

***** *Leaves bipinnate, stipular thorns, globular spikes.*

Species 87. Acacia *vera.* Acacia or Egyptian thorn, *Med. Bot. 3d edit. t.* 158. *Vesl. Ægypt. t.* 8. *bona.*

1. ACACIA CATECHU.

Officinal. CATECHU, *Lond.* ACACIÆ CATECHU EXTRACTUM, *Edin.* ACACIA CATECHU; EXTRACTUM EX LIGNO, *Dub.* Extract of Catechu.

Syn. Cachou (*F.*), Katechu; Katchu (*G.*), Cato o Catecu (*I.*), Catecu (*S.*), Cato (*Portug.*), Cutt (*Hind.*).

This tree grows plentifully in the mountains of Kanhana in Hindostan; and flowers in June. It seldom exceeds twelve feet in height, and one foot in the diameter of its stem, which is covered with a thick, rough, brown bark, and towards the summit is divided into many close branches. The leaves are placed alternately on the younger branches; and are composed of fifteen or thirty pairs of pinnæ, nearly two inches long, each having about forty pairs of linear leaflets, beset with short hairs; with a small gland on the common petiole between the bases of each pair of the pinnæ. At the base of each leaf are two short recurved, compressed spines. The flowers are hermaphrodite and male; axillary, and on close spikes four or five inches long; the calyx is tubular, hairy, dividing into five oval-pointed segments; the corolla of one piece, whitish, twice the length of the calyx, and of the same form. The filaments are numerous, double the length of the corolla, crowded with roundish anthers, and adhering at the base of the gem, which is oval, supporting a slender style the length of the filaments, and terminated by a simple stigma. The fruit is a lanceolate, compressed, smooth, brown pod, with an undulated, thin margin; and contains six or eight roundish, flattened seeds, which emit a disagreeable odour when chewed.

The inner wood of this tree is of a brown colour; and from it, according to Mr. Ker's statement [2], the *catechu* is prepared. "After felling the trees, the manufacturer carefully cuts off

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[1] Ἄκανθος τῆς Αρίας χώρας, Theophrasti. Dioscorides also mentions this species of Acacia. The name in Bahar is *Coira* or *Keira.*

[2] *Med. Obs. and Enquir.* vol. v. p. 151.

all the exterior white part of the wood. The interior coloured part is cut into chips, with which he fills a narrow-mouthed unglazed earthen pot, pouring water upon them until he sees it among the uppermost chips: and when this is half evaporated by boiling, the decoction, without straining, is poured into a flat earthen pot, boiled to one third part, and then set in a place to cool for one day. The decoction is afterwards evaporated by the heat of the sun, stirring it several times in the day; and when it is reduced to a considerable thickness, it is spread upon a mat or cloth, which has previously been covered with the ashes of cow-dung. The mass is lastly divided, by a string, into square or quadrangular pieces, which are completely dried by turning them in the sun, until they are fit for sale." Before this account was published, Catechu was generally supposed to be extracted from the Areca nut; but although there are two other species of Catechu, the one named *Cuttacamboo*, the other *Cashcutti*, yet neither are extracted from that nut. All three are used by the Indian practitioners.

This extract, when first introduced as a medicine into Europe, was named Terra Japonica, from the supposition that it came from Japan, and was an earth. It is named *cutt* by the natives of Hindostan, *cutch* by the English, and by different authors *khaath*, *cate*, *cachou*, *cachore*[1], and *catechu*.[2] There are two varieties of the true Catechu; one brought from Bengal, the other from Bombay. It is imported into Britain in bags, and sometimes in boxes or chests, containing from 3 to 4 cwt. each; and occasionally in small squares, in boxes. Pale and dark-coloured Catechu are mixed in the same package.

Qualities.—Pale Catechu is generally in small round or square cakes of a pale reddish brown colour, light and friable, with a lamellated texture, and rough fracture; has a bitterish and astringent taste, leaving a degree of sweetness on the palate; is inodorous, and has a specific gravity between 1·28 and 1·39. The dark, which is in round masses, has a deep chocolate-colour internally, with the hue of rusty iron on the outside; the texture is uniform, and the fracture resinous, marbled, and shining. It is heavier than the pale, the specific gravity being 1·45, and has a more austere and bitter taste; but in other respects it agrees with the other kind. Both are often much adulterated with sand and other impurities. Water at 60° dissolves 3 parts in 4 of pale Catechu; the alkalies

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1 Bolduc, *Mém. Acad.* 1709, p. 293.

2 This name is said to be compounded of two Oriental words, *cate*, which signifies a tree, and *chu*, juice. *Ker*, l. c.

deepen the colour of the solution, until on standing it becomes of a deep mahogany hue. According to the analysis of Sir H. Davy, there appears to be very little difference between the two varieties. Both are almost entirely soluble in the mouth, 100 grains, macerated in 18 fluid ounces of water, at 52°, left $7\frac{1}{4}$ grains only undissolved, and these were chiefly lime, aluminous earth, and sand. The solutions are inodorous, and slightly redden tincture of litmus. Strong sulphuric and muriatic acids throw down fawn-coloured precipitates in them: persulphate of iron, acetate of lead, muriate of tin, and gelatine also throw down precipitates [1], demonstrating the presence of *tannic acid;* what remains after the action of alcohol is a coloured *mucilage;* and when fine powder of Catechu is washed with small quantities of water until all the tannin and mucilage are dissolved, a pale red *extractive matter*, inodorous, very slightly astringent, sweetish, and soluble in water and in alcohol, and giving a green colour to persulphate of iron, is obtained as a residue. The proportions of these constituents, according to Davy's experiments, were as follows: 200 grains of *Bombay Catechu* afforded 109 of tannin, 68 of extractive matter, 13 of mucilage, and 10 of earths and other impurities. The same quantity of *Bengal Catechu* gave 97 of tannin, 73 of extract, 16 of mucilage, and 14 of impurities.[2]

Medicinal properties and uses.—Catechu is one of the most valuable of the vegetable astringents; and as the dark-coloured contains the greater quantity of tannin (*tannic acid*), on which its astringency depends, it is to be preferred for medicinal use. It is employed with the best effects in dysentery and diarrhœa, when the use of astringents is admissible; in alvine and uterine hæmorrhages, leucorrhœa, gleet, and in obstinate catarrhal affections. As a local astringent, it is used in sponginess of the gums, and aphthous ulcerations of the mouth and fauces; and I have found the slow solution of a small piece of it in the mouth, a certain remedy for the troublesome cough induced by a relaxed uvula hanging into and irritating the glottis; and on the same principle it is used by public singers to prevent hoarseness. Dr. Paris [3] recommends it as a dentifrice, especially when the gums are spongy; and I can verify this recommendation when the Catechu is combined with three parts of finely-powdered charcoal. In prescribing it, the practitioner should bear in mind, that alkalies and their

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[1] Tincture of muriate of iron produces a precipitate, which, on the addition of Liq. Potassæ, is redissolved, unless the quantity of the tincture be great, and the solution becomes of a deep purple or port wine colour.

[2] *Philosophical Transactions*, 1803.

[3] *Pharmacologia*, 3d edit.

carbonates destroy its astringency; that the morphia in laudanum and in wine of opium is thrown down by it; that the active principle of Ipecacuanha is destroyed by it; that metallic salts, with the exception of protosulphate of iron, form with it insoluble compounds; that it is precipitated by lime and baryta water, alum, nitrate of potassa, ferrocyanate of potassa, and sulphate of magnesia; and that isinglass and albumen also precipitate it where alkalies are not present.

An ointment composed of ℥ iv of Catechu, ʒ ix of Alum, ℥ iv of white Resin, and f ℥ x of Olive oil, with a sufficient quantity of water, is in great repute in India as an application to ulcers.

The dose of Catechu may be from grs. x. to ʒ j.

Officinal preparations. *Infusum Catechu compositum.* L. D. *Infusum Acacia Catechu.* E. *Tinctura Catechu.* L. E. *Electuarium Catechu compositum.* E. D.

2. ACACIA VERA.[1]

Officinal. ACACIA, *Lond.* ACACIÆ ARABICÆ GUMMI, *Edin.* ACACIÆ ARABICÆ et A. VERÆ GUMMI, *Dub.* Acacia Gum, *or* Gum Arabic.

Syn. Gomme Arabique (*F.*), Das Arabische gummi (*G.*), Gomma Arabica (*I.*), Goma Arabiga (*S.*), Tolh. (*A.*), Vullām pisin (*Tam.*), Kapitha (*Sans.*), Kavit ka gard (*Duk.*), Jewol latoo (*Cyng.*).

This species of acacia is found in almost every part of Africa; but the tree that yields the gum which is exported from Barbary to Great Britain, grows principally in the Atlas mountains, and at Bled-eljerrede; flowering in July. It has a hard withered aspect, and in general does not rise many feet in height, although it occasionally attains the altitude of forty feet. The stem is crooked, and covered with a grey bark, which on the branches has a purplish tinge: the leaves are alternate, bipinnate, composed of from six to eight pairs of opposite pinnæ, with a small gland on the common petiole, between the base of each pair, and having numerous pairs of narrow, elliptical, smooth leaflets. On each side of the base of the leaves are two long, diverging, white spines. The flowers are hermaphrodite and male, crowded into globular heads (*capitula*), rather than spikes, which are supported on slender peduncles, and rise, four or five together, from the axillæ of the leaves: the calyx is small, bell-shaped, and five-toothed; the corolla is divided into five narrow yellowish segments; the filaments are numerous, capillary, bearing roundish yellow anthers; the germen is conical, with a slender stile and simple stigma: and the pods, which are three or four inches

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[1] Ἄκανθος αἰγυπτίη, Hippocratis. Ἀκακία, Dioscoridis. In Barbary it is named *attaleh*.—*Jackson's Morocco*, 4to. p. 33. At the Cape of Good Hope it is called *Dornboom.* Sparmaun. The Arabs in Upper Egypt call it *Sant.*

long, and half an inch broad, contain several flattish brown seeds.[1]

The gum exudes naturally from the bark of the trunk and the branches of the tree, in a soft, nearly fluid state, and hardens in the air without losing its transparency. It is collected about the middle of December. "It appears," Mr. Jackson informs us, "to be the product of disease: for in the hottest seasons, and from the most sickly trees, the greatest quantity is procured. Very little or none is got in a moist, cool, or mild summer. It is gathered in July and August, when the weather is hot and parching. It has a faint smell when first stowed in the warehouses, and is heard to crack spontaneously for many weeks. The best gum is procured from Morocco, Rasel-wed in the province of Suse, and Bledhummer in the province of Abda."[2] When Gum Arabic was first brought to Europe, Marseilles was the sole depôt; and as the gum was supposed to come from the ports of Gidda and Tor, in the Red Sea, it was called *Gomme Gedda* and *Gomme Turique.* It is now imported from Barbary and Morocco in large casks. Three kinds of gum are known in commerce: *Gum Arabic*, in white, much cracked, round pieces; *Barbary Gum*, in small compact, transparent, yellowish or brownish-yellow pieces, very brittle; *Gum Gedda*, in longer, roundish, brownish-red, not very brittle pieces; and *Gum Senegal*, which was introduced into Europe by the Dutch, in the 17th century, and is often mixed with the Barbary gum. The Senegal gum is obtained from various trees, but chiefly from two; one called *verec*, which yields a white gum, the other called *nebuel*, which yields a red gum, varieties of the Acacia *gummifera.*[3]

Qualities.—Gum is generally in irregularly shaped pieces, hard, brittle, semitransparent, its fracture possessing a considerable degree of lustre; and is neither fusible nor volatile. When pure, it is almost colourless, or of a pale yellowish

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[1] From the unripe pods the *acaciæ veræ succus* of the ancients was expressed. Vide *Murray, App. Med.* ii. 412. The seeds yield a reddish dye. *Jackson*, l. c.

[2] *Jackson*; p. 83. In 1805, the quantity exported from Mogodor to London was 277,534 lbs. Ib. l. c.

[3] Although, by the treaty which delivered up Senegal to France in 1783, the gum trade was reserved to England, and has never been annulled, yet no advantage was taken of this right by the English; until the commencement of the present year (1821); when the trade was again renewed at Portendic, under the protection of Commodore Sir George Collier.—Portendic is in latitude 18° 19′ north, by 16° 10′ west of Greenwich. The Acacia forest of Sahel, which yields a very pure white gum, is sixty miles, and the forest of El-Hiebar eighty miles from Portendic. The gum is collected and brought to the coast by the Trarzhar Moors, who receive in exchange baft and other English goods: "the usual quantity given for a piece of blue baft, which costs from fifteen to thirty shillings, is from 100 to 133 lbs. weight of gum." *Sierra Leone Royal Gazette*, May 26th, 1821.

hue; is insipid, inodorous, and dissolves completely away in the mouth. Its specific gravity varies from 1·3161 to 1·4317. It is often mixed with the Gum Senegal, which is nearly as pure, but in larger masses, generally of a darker colour and more clammy and tenacious, and with other gums less pure, particularly a kind brought from the East Indies, which is still darker coloured and less soluble.[1]

Gum is soluble in water, either cold or hot, and forms a viscid solution; which, if evaporated, becomes very thick and adhesive, and at length the gum is obtained in a concrete form, equally soluble as before. It is also soluble in the vegetable acids; but is insoluble in alcohol, in ether, and in bland and volatile oils: yet, owing to its viscidity, it renders by trituration both the volatile and fixed oils and resins miscible with water, forming a white opaque mixture. Concentrated sulphuric acid blackens, and partially decomposes it, and acetic acid is produced: strong nitric acid converts it into the oxalic, mucic, malic, and saccholactic acids; muriatic exerts very little action on it; but chlorine changes it into citric acid. Solutions of the alkalies and alkaline earths dissolve it without producing any change on it. For an account of the action of other agents on it, see *Mucilago Acaciæ*.

The chymical analysis of gum, by Gay-Lussac and Thénard, shows, that its constituents are 42·23 of carbon, 6·93 of hydrogen, and 50·82 of oxygen, with a small proportion of nitrogen and lime; which last element is supposed to render it incapable of undergoing the fermentative process.[2] According to Dr. Prout, its constituents are, carbon 36·3, water 63·7. I have found, however, that it nevertheless contains a small proportion of gluten; for when rubbed up with a spirituous solution of guaiac, a blue colour is evolved.

Medical properties.—Gum exerts no action on the living system; but is a simple demulcent, serving to lubricate abraded surfaces, and involve acrid matters in the primæ viæ; and it effects these purposes the more readily from its passing through the bowels, scarcely acted upon by the assimilative functions.[3]

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1 The gum which exudes from the cherry, plum, and other trees of the genus *Prunus*, in this country, is Cerasin; but the gum alluded to is very similar to gum arabic, and is furnished by the Acacia *Arabica* (*Roxburgh's Coromandel Plants*, t. 149.) or Babul tree of Hindostan. The gum is called *Bábuled gund*, by the natives. But the pure gum of India is furnished by different species of *Terminalia*; and by the Feronia *Elephantum*.

2 *Murray's Chymistry*, vol. iv. 180. The last analysis, which is by Berzelius, makes the components in 100 parts to be, hydrogen 6·792, carbon 41·752, oxygen 51·456, and a trace of nitrogen.

3 It is nevertheless sometimes used as food by the Moors, and also by the Boschis-men, of Southern Africa; and at Senaar, in Dongola, is much employed in cookery: six ounces are sufficient for the daily support of an adult.

In the solid form it is scarcely ever given, unless to sheathe the fauces, and allay the tickling irritation which occasions the cough in catarrh and phthisis pulmonalis, in which cases a piece of it is allowed to dissolve slowly in the mouth. It is chiefly used in the state of mucilage. Vide *Mucilago Acaciæ.*

Officinal preparations.—*Mucilago Acaciæ,* E. *Mucilago gummi Arabicæ,* D. *Emulsio Acaciæ Arabicæ,* E. *Emulsio Arabica,* D. *Pulvis Tragacanthæ comp.* L. *Confectio Amygdalæ,* L. D. *Troc. gummosi, et varii,* E.

ACETOSELLA. Vide *Oxalis Acetosella.*

ACETUM, *Lond. Edin.* ACETUM VINI, *Dub.* Vinegar.

Syn. Vinaigre (*F.*), Essig (*G.*), Aceto (*I.*), Vinagre (*S.*), Viinaedike (*Danish*), Winättika (*Swed.*), Canchiea (*Sans.*), Khull (*Arab.*), Chooca Wynazin (*Malay*), Kadi (*Tam.*), Cirka (*Pers.*), Kudidia (*Cyng*), (*Belg.*).

This is a well known acid liquor, produced by exciting the acetous fermentation in substances which have undergone, or are susceptible of, the vinous fermentation. Sugar and water, the saccharine vegetable juices, infusions of malt, malt liquors, cider, and wine[1], may be converted into vinegar, by adding to them yeast or any other ferment, and exposing them in vessels to which the air has access, in a temperature between 75° and 90°. In wine countries, as France and Italy, vinegar is made from the lees of wine, which are worked up with new wine, then strained and exposed to the heat of the sun, or placed in stoved rooms, in casks set upright, with a hole cut through the heading, and left open until the whole of the liquor is thoroughly acidified. In this country it is prepared chiefly from malt. An infusion of malt is made, then properly cooled, and put into large and deep fermenting tuns; "where it is mixed with yeast, and kept in fermentation for four or five days." The liquor is now distributed into smaller vessels, placed in a chamber heated by means of a stove; and kept there for about six weeks, or until the whole is soured. This is emptied into common barrels, which are placed in the open air, the bung-hole of each being simply covered with a tile to keep out the wet: and in this situation such a gentle fermentation goes on, that in four or five months, according to the heat of the weather, perfect vinegar is formed. The process is then completed in the following manner: "Large tuns are employed with a false bottom, on which is put a quantity of the refuse of raisins and other fruit, left by makers of home-made wines, called, technically, *rape.* These rape tuns are worked by pairs: one of them is quite filled with the vinegar from the barrels, and the other only three quarters full, so that the fermentation is excited more easily in the latter than

[1] New wines are better for this purpose than old, as they contain more extractive matter.

the former, and every day a portion of the vinegar is laded from one to the other till the process is finished."[1]

The theory of the acetous fermentation is not yet fully understood. Air and a moderate temperature are necessary for exciting and keeping it up. The former affinities between the components of the ingredients are broken, and new ones formed; while a quantity of carbon is thrown off, and uniting with the oxygen of the air, produces the carbonic acid gas, which appears during the process: but the production of carbonic acid is not essential to the formation of acetous acid. Although alcohol alone cannot easily be converted into vinegar, yet the strongest wine produces the best vinegar; and hence that made from malt is weaker, less pure, and more liable to spoil, than wine vinegar. The essential part of vinegar is *acetic acid* and *water*, in the proportion of five parts to ninety-five of water[2]: but it also contains colouring matter, some undecomposed *alcohol, gluten, mucilage, sugar, extractive matter*, a small proportion ($\frac{1}{1000}$) of its weight of *sulphuric acid*, and often some *malic* and *tartaric acids.*

Qualities.—Vinegar, when well made, is clear and limpid; has an agreeable penetrating odour, and a pleasant acid taste.

The colour varies from a pale yellow to a deep red: and as it is derived from the extractive matter, malt vinegar is always higher coloured than wine vinegar. When long kept, particularly if it be exposed to the air, vinegar, becomes muddy and ropy, acquires an unpleasant smell, loses its acidity, and putrefies. It, however, may be kept good for a much longer time if it be boiled for a few minutes, so as to coagulate and separate the gluten, on the presence of which the above changes depend; and be preserved in well corked bottles.[3] It is often adulterated with sulphuric acid, which is allowed to a certain extent by the Excise laws: it may be detected by a solution of acetate of baryta, forming, when dropped into the suspected vinegar, a white precipitate, which is *insoluble* in nitric acid, after being exposed to a strong heat. If 1000 parts yield more than 2·5 of sulphate of baryta, the vinegar contains too much sulphuric acid. If water of baryta be employed, sulphate of potassa or of lime will also produce a precipitate, if present in the vinegar, in which case a preferable test is chalk short of the quantity necessary to saturate the portion of vinegar: for by throwing the whole on a filter, and adding distilled water, the acetate of lime is dissolved, but the sulphate which is formed, if sulphuric acid be present, re-

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[1] *Aikin's Dictionary of Chymistry*, art. *Vinegar*.

[2] *Journal of Science and the Arts*, vol. vi. p. 259.

[3] Vinegar termed No. 24. is estimated to contain 5 per cent. of real acid.

mains undissolved on the filter. Muriatic acid is detected by nitrate of silver forming a precipitate, which is insoluble in nitric acid; but soluble whilst it is still moist in liquid ammonia. Nitric acid is detected by first mixing some common salt in the vinegar, then saturating with potassa, and evaporating to dryness: if gold leaf be then diffused through equal parts of sulphuric acid and water, and the mixture added to the dry residue and boiled, if the vinegar contains nitric acid, the gold leaf will be dissolved.[1] If *grains of paradise, spurge flax, capsicum,* or *pellitory* of Spain, which are sometimes used to adulterate vinegar, be present, they can only be detected by the taste.

The use of vinegar as a condiment, and an antiseptic, for pickling and preserving animal and vegetable matter, is well known.

Medical properties and uses.—Vinegar, when taken into the stomach, acts as a tonic and a refrigerant, promotes diaphoresis and the discharge of urine: and when externally applied is moderately stimulant and astringent.

In inflammatory fevers it may be used to acidulate the ordinary beverage. It is given as a remedy in putrid diseases and in scurvy: and it is the most easily procured, and the best means of counteracting the effects of over doses of narcotic poisons, after the poisons have been removed from the stomach; for which purpose it should be administered in doses of a table spoonful, frequently repeated, after the stomach has been freely emptied by a proper emetic. It acts as a conservative agent when given with acetate of lead, and prevents any colic occurring. It is employed as a glyster in obstinate costiveness; and externally in the form of fomentation, or of lotion, in burns, bruises, sprains, and chronic ophthalmia; and, diluted with water, it is the best lotion for clearing the eye of small particles of lime, when they adhere to any part of the ball or the lids. Its vapour is inhaled in putrid sore throat; and it is diffused through sick rooms with the view of neutralising pestilential effluvia: but as a fumigation it has little efficacy. The dose of vinegar is f ʒ ss. to f ʒ iv. in any bland vehicle; and the quantity given in glysters f ℥ j. to f ℥ ij.

Officinal preparations. *Acidum aceticum dilutum,* E. *Acetum destillatum,* L. D. *Syrupus Aceti,* E. *Syr. Colchici autumnalis,* E. *Cataplasma sinapis,* L. D. *Ceratum Saponis,* L. *Linimentum Æruginis,* L.

A'CIDUM ARSENIOSUM. Vide *Arsenicum.*

A'CIDUM CITRICUM, *Lond.* Vide *Acitum Citricum,* among the Preparations.

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[1] *Brande's Manual of Pharm.* p. 5.

A'CIDUM SULPHURICUM, *Lond. Edin.* ACIDUM SULPHURICUM VENALE. *Dub.* Sulphuric acid. (*Specific gravity*, 1·850. *Lond. Dub.* 1·845. *Edin.*)

Syn. Acide sulphurique (*F.*), Vitriolöl schwefelsaüre (*G.*), Acido solforico (*I.*), Vitriool oli.—Reines Zwavebzuur (*Dutch*), Vitriol olje (*Dan.*), Vitriolja, Swafwelsyra (*Swed.*), Gundaica Atr. (*H.*), Gundudaek Trāvagum (*Tam.*), Arckgowgird (*Pers.*), Rooch (*Arab.*).

This acid is said to be found, in a concrete state, in the cavities of some volcanic mountains, and dissolved in some mineral waters [1]; but, for the purpose of medicine and the arts, it is prepared artificially, either by decomposing sulphate of iron [2] by the process of distillation in close vessels, or by the combustion of sulphur. The first mode is the most ancient, and is still employed in several places on the Continent; but the second is that generally adopted by the manufacturers in Great Britain, and therefore requires particularly to be described.

Into a chamber lined with sheet-lead, having no opening but a small door placed a few inches from the floor, and made to shut very close, water is poured so as to cover the floor, and rise upon it to the height of one or two inches. A mixture of eight parts of refined Sicilian sulphur and one of nitre is burned on a furnace, in such a manner that the vapour is conducted into the leaden chamber.[3] The nitric acid of the nitrate yields oxygen to the sulphur, and converts a portion of it into sulphuric acid, which combines with the potassa of the nitrate: but the greater part of the sulphur in vapour uniting with the oxygen of the air of the chamber is formed into sulphurous acid gas, whilst nitrous acid results from the decomposition of the nitric acid: these uniting, aided by humidity, lose their gaseous character, and form a white crystalline compound, which coming in contact with the water below, the sulphurous acid is changed into sulphuric acid at the expense of the nitrous acid, which, being thus robbed of its oxygen, escapes in the form of binoxide of nitrogen. This gas, now rising to the roof of the chamber, towards the aperture, attracts a fresh

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[1] Hence the old names, oil of *vitriol* and vitriolic acid, which are still the commercial names of this acid, from *green vitriol*, the old name of the sulphate of iron. This method is still practised at Nordhausen in Germany. The acid is disengaged from the oxide of iron by the heat; but, owing to the small quantity of water which it contains, it is of greater specific gravity and more fuming than the acid which is manufactured in this country. The specific gravity of the fuming acid of Nordhausen is 1·896.

[2] M. Baldassari stated that he had found it, in 1776, crystallized in a grotto of Mount Amiata: M. Pictet saw it dropping from the roof of a grotto near the town of Aix in Provence: M. Humboldt found it mixed with hydrochloric acid in the waters of the Rio-Vinaigre; and Vauquelin detected it in the water of a lake in the island of Java.

[3] This process was first used by Dr. Roebuck in 1749. *Edin. Phil. Trans.* vol. iv.

supply of oxygen, and becomes again nitrous acid, which descending, owing to its density, among the sulphurous acid gas, once more converts it into sulphuric acid, and is again disengaged when it comes in contact with the water, to undergo fresh combinations and decompositions, which go on successively until the whole of the sulphurous acid is changed into sulphuric acid.[1] When the water is sufficiently acidified it is drawn off through a leaden pipe, with a stop-cock, at the bottom of the chamber; and contains, besides sulphuric acid, some sulphurous acid, a portion of nitric oxide, and some sulphate of lead. The liquor is at first of a brownish colour; but after it is concentrated and purified, first by evaporation in leaden boilers and afterwards by boiling in large green glass retorts, it becomes a colourless, dense fluid, having, when perfectly pure, a specific gravity not exceeding 1·8485: and is brought to market in large globular glass bottles, surrounded with wicker-work, and sold under the name of *oil of vitriol.*

Sulphuric acid thus prepared is not perfectly pure, but is united with about three or four per cent. of saline matter, which consists of two thirds of sulphate of potassa, and one third of sulphate of lead, derived from the chambers in which it is manufactured. Both these impurities are precipitated by adding three parts of distilled water to the acid, which can again be concentrated by distillation; thence the addition of water is a good test of the purity of this acid. The lead is thrown down in the form of a white insoluble powder; from which the pure acid can be decanted. The amount of these impurities may be readily ascertained by evaporating a definite weight of the acid in a platinum cup, placed on the red cinders of a common fire.[2] It is sometimes adulterated with sulphate of potassa, for the purpose of increasing its specific gravity; in which case the best method of detection is to saturate the suspected acid with ammonia, and then to expel the sulphate of ammonia thus formed by a red heat: the sulphate of potassa with which the acid was adulterated will remain fixed. According to Dr. Ure, the pure liquid acid, which is, accurately speaking, a hydroacid of sp. gr. 1·7245, consists of about 81·54 parts of real acid, and 18·46 of water; and the elements of the real acid, according

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[1] A white saline matter is often deposited on the sides of the leaden chambers. Dr. Thomas Thomson analyzed this, and found it to consist of sulphurous acid, sulphuric acid, nitric acid, sulphate of lead and water. *Records of General Science*, vol. iv. p. 96.

[2] Dr. Ure, who suggested this test, says, "If more than 5 grains of matter remain from 500 of acid, we may pronounce it sophisticated." *Journal of Science and the Arts*, vol. iv. p. 115.

to the estimate of Dr. Thomson[1], which is probably the most accurate on this subject, are 40 of sulphur, and 60 of oxygen, in 100 parts of acid; or one atom of sulphur = 16·1, and three atoms of oxygen, $8 \times 3 = 24$; but with regard to these proportions chymists are not agreed.[2] The equivalent of this acid is 40·1.

Qualities.—Liquid sulphuric acid, when pure, is as colourless and transparent as water[3], inodorous, corrosive, heavy; and has the consistence of oil: its specific gravity at a temperature of 60° Fahr. is 1·845, and one fluid ounce weighs fourteen drachms. It has all the generic characters of an acid; reddening the vegetable blue colours when diluted with a sufficiency of water; but when undiluted, as it carbonizes all vegetable and animal matters, it turns vegetable colours brown. Even when largely diluted, it has an intensely acid taste. When rubbed between the fingers, it feels at first unctuous, owing to its attracting moisture, and dissolving the cuticle; but it afterwards excites a burning sensation. It freezes at 15° into six-sided prismatic crystals[4], bevelled at both extremities: when of the specific gravity of 1·845, it boils at 650°; and at a higher temperature, it is decomposed and converted into sulphurous acid and oxygen gas. It attracts water so rapidly from the atmosphere, as to increase its weight one third in twenty-four hours, and to double its weight in the course of a month (hence the necessity of keeping the air excluded from it), and at the moment it unites with water, the temperature of the mixture is much raised: this rises to 300°, when four parts by weight of the acid are suddenly mixed with one of water. It acquires a brown colour when mixed with any vegetable matter[5], and converts syrup into charcoal; therefore bottles in which it is kept must be stopped with glass stoppers. When brought to sp. gr. of 1·780, by being diluted with water, it boils at 435°, and freezes at 45°, or 13 degrees above the freezing point of water; a fact important to trading chymists, as in this state it is apt to burst the bottles in which it is kept, by its expansion in the act of freezing.[6] It forms neutral salts termed *sulphates*, with the alkalies, earths,

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1 *System of Chym.* 5th ed. vol. i. p. 288.

2 Bucholz makes the proportions to be 57·5 of sulphur, and 42·5 of oxygen.

3 Sulphuric acid is so easily coloured by contact with either vegetable or animal matters, without being deteriorated, that we cannot regard the slight colour which it acquires from these circumstances as any indication of its impurity.

4 *Macnab, Hudson's Bay.*

5 This is owing to its strong affinity for water, breaking the affinities which exist between the vegetable components, so as to occasion the hydrogen and oxygen to unite and form water, while the carbon is precipitated.

6 See *Parke's Chymical Essays,* vol. ii.

and metallic oxides; separates the acids of all other salts, and decomposes the alkaline and earthy sulphurets. The strength of this acid is readily determined by saturating it with dry carbonate of soda, 53·3 grains of which indicate 40·1 of real acid. An unerring test of the presence of this acid is a solution of chloride of barium. It precipitates all astringent infusions.

Medical properties and uses.—This acid is a valuable tonic astringent; but, as it is employed internally in a diluted state only, its medicinal powers shall be explained under the article *Acidum Sulphuricum Dilutum.* Although it powerfully corrodes the skin, yet, on account of its fluidity, it cannot be used as an escharotic; but when united with sixteen times its weight of lard, it forms an ointment which has been successfully employed in the cure of scabies. It is a strong corrosive poison. When it has been taken into the stomach, either accidentally or as a poison, it produces the following symptoms: excruciating pain in the stomach and bowels, faintings, feeble pulse, frequent trismus, difficult deglutition, vomitings, convulsions, and death. The tongue, uvula, tonsils, insides of the cheeks, and fauces, appear of a yellowish white colour, and wrinkled, the teeth are surrounded by a black circle, and the lips are yellowish. What is vomited, effervesces with chalk and marble, and corrodes leather. It most frequently proves fatal without entering the stomach, by its corrosive action on the œsophagus. The best antidote is magnesia and water.[1]

Officinal preparations.—*Acidum sulphuricum purum,* D. *Acidum sulphuricum dilutum,* L. E. D. *Acid. sulphuricum aromaticum,* E. D. *Sulphas potassæ,* L. E. D. *Potassæ bisulphas,* L. D. *Sodæ sulphas,* L. E. D. *Magnesiæ sulphas,* L. E. D. *Ferri sulphas,* L. E. D. *Hydrargyri chloridum,* L. *Hydrargyri bichloridum,* L. E. *Hydrargyri murias corrosivus,* D. *Sub-sulphas hydrargyri flavus,* E. *Zinci sulphas,* L. E. D. *Unguentum acidi sulphurici,* D. *Æther sulphuricus,* L. E. D.

ACONI'TUM.[2] *Spec. Plant. Willd.* ii. 1235.

Cl. 13. *Ord.* 3. Polyandria Trigynia. *Nat. ord.* Ranunculaceæ.
G. 1062. *Cal.* none. *Petals* five, the highest arched. *Nectaries* two, peduncled, recurved. *Pods,* three to five.
* * *With blue corollas.*

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[1] I witnessed a case in which a fluid ounce of the strong acid was swallowed, with the intention of committing suicide, by a farrier; and, although it remained an hour in the stomach before it was ejected by vomiting, yet the person recovered. T.

[2] Labor. Chym. 1808.

> "Quo quia nascuntur dura vivacia caute
> Agrestes Aconita vocant."
>
> OVID.

But Theophrastus derives the name from *Acone,* a city of Bithynia, near which it grew in great abundance.

Sp. 8. A. *Napellus* (Edin.) *Med. Bot.* 3*d ed.* 461. *t.* 165.
Sp. 9. A. *paniculatum* (Lond. Dub.) De Candolle *Regni veg. Syst. Nat.* 375.[1]

Officinal. ACONITI FOLIA, *Lond.* ACONITI NAPELLI FOLIA, *Edin.* ACONITUM; FOLIA, *Dub.* The leaves of Monkshood.

Syn. Aconit, Chaperon de Moine (*F.*), Blauer-strumhut (*G.*), Monnikskappen (*Belg.*), Stermhut (*Dan*), Stermhatt (*Swed.*), Napello (*I.*), Aconito (*S.*).

The species of aconite now introduced into the London and Dublin pharmacopœias is regarded as the plant originally used by Stoerk. It is a perennial plant flowering in July; and found native in the alpine forests of Carinthia, Carniola, and the mountainous parts of Germany.

The roots are napiform and fibrous; the stem is firm, elongated, erect, smooth, rising to the height of five or six feet, leafy, and terminating in a long sparse panicle of flowers, racemose, and the peduncles branched below. The lower leaves are few, alternate on long channelled petioles; palmated or rather pedate, being divided to the base into three or five broad cuneiform divisions, deeply cleft and toothed; the petioles are shorter, and the leaves less divided, the nearer they are to the summit of the stem: the colour of the whole is a deep green on the upper disk, and a pale green on the under; both sides are naked, smooth, and shining. The flowers are of a cærulean blue, on unifloral, erect, axillary, pubescent pedicels, with subulate bracteoles. The calyx consists of five petaloid sepals; two lateral and orbiculate, two inferior and oblong, and the uppermost helmet-shaped, and more acuminate than in Napellus, covering two singular, peduncled petals; cuculated, the spur of each being hooked and blunt; the lip lanceolate, revolute, and bifid. The filaments are spread, and white at the base, where they closely cover the germens; but the upper part is filiform, purple, spreading, and bearing whitish anthers. The germens are three, four, or five, with simple reflected stigmas; and become capsules, containing many angular seeds.

For medicinal use, the leaves should be gathered when the flowers appear.

Qualities.—Aconite roots and leaves have a faint narcotic odour; and a moderately bitter, acrid taste, leaving a painful sensation of heat in the mouth, when they are much chewed. The whole of the plant is poisonous; but the deleterious qualities of the leaves are lost in a considerable degree when they are dried, or long kept, and much of the acrimony is dissipated. Its narcotic principle was discovered by M. Brandes

[1] γ. *Storckianum,* Caule flexuoso, panicula laxa debili, rostro brevi. In Alpibus Helveticis. A. *Napellus* officinalis. Storck, Libell. de *Stram.* p. 69. icon.

to be an alkali, which he has named Aconitine. (See *Aconitina*, PART III.)

Medical uses and properties.—Aconitina is narcotic, diaphoretic, and in some cases diuretic.[1] In over doses it occasions violent nausea, vomiting, hypercatharsis, vertigo, cold sweats, mania, and convulsions which terminate in death; and these effects appear to depend on its action on the nervous system, for although it operates topically, yet dissections of fatal cases have not displayed any particular marks of inflammatory action.

Stoerk first administered Aconite internally in chronic rheumatism, gout, exostosis, paralysis, and scirrhus; and since the publication of his experiments, in 1702, it has been advantageously employed in similar cases, and also in amaurosis, scrophula, cancer, itch, venereal nodes, and intermittents. Much caution is required in the exhibition of it; and it is absolutely necessary to know the length of time it has been gathered, as its activity varies so very considerably, as to require this to be ascertained before the dose can be apportioned. Besides the Aconitina, the plant is given in the form of powder, extract, and tincture[2]; and may be combined with calomel, antimonials, camphor, and guaiacum. The dose of the powder is one or two grains, gradually increasing it to six or eight.

Officinal preparations. — *Aconitina*, L. *Extractum Aconiti*, L. E. D.

ACORUS. *Spec. Plant. Willd.* ii. 199.

Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. ord.* Acoraceæ.

G. 663. *Spadix* cylindrical, covered with florets. *Cor.* petals six, naked. *Style* O. *Capsule* three-celled.

Species 1. A. *Calamus.* The Sweet-flag. *Med. Bot. 3d edit.* 725. *t.* 248. *Smith, Flor. Brit.* i. 373.

Officinal. ACORUS, *Lond.* ACORI CALAMI RADIX, *Edin.* Sweet-flag.[3]

Syn. Acorus odorant (*F.*), Kalmus wurzel (*G.*), Kalmus (*Dutch, Dan. Swed.*), Calamo aromatico (*I.*), Acora calamo (*S.*), Tatarskie Ziele (*Polish*), Vassamboo (*Tam.*), Vadge (*Pers.*), Shivah Buch (*Beng.*), Igir (*Arab.*), Wudda Kuha (*Cyng.*), Bach (*H.*), Vacha (*San.*), Deringgo (*Javanese*).

The sweet-flag is found growing in marshes and rivulets, over the greater part of Europe and Asia. It is abundant in all the marshy counties of Britain, producing its flowers in May and June.[4]

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1 De Candolle informs us that the peasants employ it to cure dropsy.

2 The tincture is made by digesting one part of leaves of aconite in six parts of alcohol; it may be given in doses of from ♏ v. to ♏ x., gradually increased to ♏ xl.

3 Καλάμου ἀρωματικοῦ Dioscoridis.

4 In the rivers of Norfolk plentiful. On Hillingdon-common, Middlesex, and other places about London. *Smith*, l. c.

The rhizome is perennial, horizontal, long, somewhat flatted, crooked, and full of joints or rings, whence the radical fibres or roots spring from the underside. It is from half an inch to one inch in thickness; externally, when fresh, of a greenish yellow colour, internally whitish and spongy. The leaves spring directly from the root; are sword-shaped, about three feet in length, and generally waved along one of the edges; of a bright green colour, and emitting a strong aromatic odour when bruised. The flowers are hermaphrodite, surrounded with scales, small, and produced on a very close, tessellated, conical spike four inches long, pushed out from the side of a naked stalk or scape, two-edged, and terminating like a leaf. They have no calyx. The petals are six, small, erect, regular, with the apex inflected, and of a pale green colour. The filaments are alternate, with the petals, thread-like, supporting double anthers. The germen is elliptical, crowned with a sessile-pointed stigma: the fruit bascate, but juiceless.

The greater part of the rhizomes in use are brought from Norfolk; and are equal in quality to those imported from the Levant.

Qualities.—The rhizome of sweet-flag has a pleasant aromatic odour, similar to that of a mixture of cinnamon and allspice; the taste is warm, bitterish, pungent, and aromatic.[1] In the dried state, the cuticle is corrugated, of a yellowish brown colour, with many small, white, elevated circles on the under side, whence the radical fibres issued. It breaks with a short rough fracture; is internally of a pale rosy buff colour, its texture is spongy: both the smell and taste are lessened by exsiccation. The aromatic principle is a volatile oil, which can be obtained by distillation. According to Volter and Dann, 14 lbs. of the dried rhizomes yield ℨ xxij of volatile oil. The bitter matter, extractive gum, and inuline, with a small proportion of oil, are extracted by infusion in boiling water. The rhizomes contain a considerable quantity of fecula, which is dissolved in the infusion, and copiously precipitated from it by the acetates of lead.

Medical properties and uses.—This rhizome is tonic and aromatic. It has been employed in medicine since the time of Hippocrates.[2] By the moderns, it is successfully employed in intermittent fever, even after bark has failed; and is certainly a very useful addition to Cinchona. It is also an

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[1] Linnæus erroneously considered it the only native aromatic plant of northern climates.—The candied root is employed at Constantinople as a preservative against epidemic diseases.

[2] *Morb. Mul.* ii. 951.

appropriate adjunct to bitters, and stomachic infusions, in cases of dyspepsia; particularly when vertigo is one of the symptoms. It is too seldom prescribed. The dose in substance is from gr. x. to ʒ j.: and of the infusion, made with ʒ vj. of the bruised rhizome in f ℥ xij. of boiling water, a cupful may be given three or four times a day.

ADEPS. Vide *Sus Scrofa.*

ADEPS OVILLUS. Vide *Ovis Aries.*

ÆRUGO. Vide *Diacetas Cupri impura.*

ALLIUM. *Spec. Plant. Willd.* ii. 63.

Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. ord.* Liliaceæ.

G. 626. *Calyx* and *Corolla* confounded, six-parted, spreading. *Spathe* many flowered. *Umbel* heaped together. *Capsule* superior.

* *Stem-leaves plane. Umbel bearing a capsule.*

Species 2. Allium *porrum.* The Leek. *Rich. Med. Bot. t.* 11. *p.* 535.

* * *Stem leaves plane. Umbel bulbiferous.*

Species 14. Allium *sativum.* Garlic. *Med. Bot.* 3*d edit. t.* 256.

**** *Leaves radical. Stem naked.*

Species 43. Allium *Cepa.* The Onion.

1. ALLIUM PORRUM.[1]

Officinal. PORRUM, *Lond.* The Leek.

Syn. Poireau (*F.*), Spanische lauch (*G.*), Porro (*I.*).

The leek is a biennial plant, a native of Switzerland, flowering in June.

The bulb consists of concentric circles, seated on a radical plate, from which spring fibrous roots. The leaves are broad and gramineous; the stem is a naked scape, bearing a congested capital, or rather spherical umbel of flowers; with rough-keeled petals, shorter than the stamens, which are alternately trifid. It is better known as an alimentary or pot herb than as an article of Materia Medica.

Qualities.—All the parts of the plant have a pungent offensive odour, and an acrimonious taste; properties depending on an essential volatile oil, which is much dissipated by boiling, and can be consequently separated by distillation.

Medical properties and uses.—The leek is stimulant and diuretic. The expressed juice has been given with advantage in ascites and other dropsies. The dose is from f ʒ ss. to f ʒ ij. mixed with mucilage or syrup.

2. ALLIUM SATIVUM.[2]

Officinal. ALLIUM, *Lond.* ALLII SATIVI RADIX, *Edin.* ALLIUM SATIVUM; BULBUS, *Dub.* Garlic.

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[1] Πράσον Theophrasti et Dioscoridis.

[2] Σκόροδον Theophrasti et Dioscoridis.

Syn. Ail (*F.*), Knoblauch (*G.*), Aglio (*I.*), Ajo sativo (*S.*), Knoflook (*Belg.*), Kvidlögen (*Dan.*), Hvitloken (*Swed*)., Czosnek (*Polish*), Tschesnok (*Russian*), Seer (*Pers.*), Soom (*Arab.*), Bawang (*Jav.*), Lasûna (*San.*), Lehsen (*H.*), Vullay poondoo (*Tam.*), Bavangpootie (*Malay*).

Garlic is a perennial bulbiferous plant, found wild in Sicily, and cultivated in most parts of Europe for culinary and medicinal use. It flowers in July.

The bulbs of this species of Allium are numerous; three or more being enclosed in one covering, forming a nucleus, round which others are disposed, and the whole enveloped in a common membrane, from the base of which proceed long white fibrous roots. The stem rises two feet in height, surrounded with many long flat, linear grass-like leaves, proceeding chiefly from the young bulbs; and is terminated by a mixed cluster of flowers and bulbs, enclosed in a spathe, which opens at one side and withers. The flowers are small, consisting of six oblong white petals, with tapering filaments, shorter than the corolla, and supporting erect anthers: the germen is superior, short, angular, bearing a simple style with a sharp stigma; and becoming a short, broad, three-celled capsule, containing roundish seeds.

Garlic is dug up for use in the month of August: it is then cleaned and dried in the sun, and preserved in bunches in a dry place. In this state the exterior membrane is of a dirty white colour, and of a withered aspect; but the bulbs, which are called *cloves*, are white, succulent, and juicy. On drying, they lose nine parts in fifteen of their weight.

Qualities.—All the parts of the plant, but particularly the bulbs, have a pungent offensive odour, and an acrimonious biting taste. These properties depend on volatile oil, which can be obtained separate by distillation with water; of a thick and ropy consistence, a yellow colour, heavier than water, and possessing, in an eminent degree, the sensible qualities of the garlic. It blisters the skin when applied to it, and strikes a black colour when triturated with oxide of iron. Simple coction with water renders garlic mild and inert. The acrid principle is obtained also by expression; and it is in a less degree extracted by water, by alcohol[1], and by acetic acid; it is destroyed by decoction in water. The odour is so penetrating that, when garlic is applied to the soles of the feet, it is perceived in the breath, the urine, and the perspiration. From 1406 parts of fresh garlic, Cadet[2] obtained 520 of mucilage, 37 of albumen, 48 of fibrous matter, and 801 of water

[1] With alcohol, a reddish yellow tincture is obtained, which leaves, when evaporated, a very acrid brown extract, that attracts moisture from the air.

[2] *Ann. de Chymie,* lix. p. 106.

by estimate. Bouillon la Grange[1] found sulphur also, with vegetable albumen, and sugar.

Medical properties and uses.—Garlic is stimulant, diaphoretic, expectorant, diuretic, and anthelmintic, when exhibited internally; and rubefacient when externally applied.

It has been successfully administered in intermittents, and in fevers of the typhoid type. If the body be kept warm during its use, it acts powerfully by diaphoresis. It has long been esteemed a valuable remedy in pituitous asthma, chronic catarrh, flatulent colic, calculus, and dropsies; and as a preventive of worms. Externally it is applied bruised to the soles of the feet, in the coma of typhus; and in confluent small-pox, when the determination to the head is considerable. A poultice made of it is a good resolvent of indolent tumours. A clove of it, wrapped in cotton or gauze, or a few drops of the juice introduced into the external ear, prove efficacious in atonic deafness; and applied to the pubis as a poultice in retention of urine, owing to a want of action in the bladder, it sometimes is effectual in stimulating that viscus to discharge its contents. The juice is also applied, united with oil, to herpetic eruptions.

Garlic may be exhibited in substance, the whole clove or pieces of it being dipped in oil and swallowed; or it may be formed into pills. The expressed juice also is given mixed with sugar; or the bulb may be infused in milk, which was Rosenstein's mode of administering it to children afflicted with worms. It is frequently united with calomel in the form of pill or bolus, in hydropic cases. An ointment is formed by mixing the juice with oil. The bruised bulb has also been used as a suppurative.

The dose, in substance, is from ʒss. to ʒij.; or from one to six cloves, swallowed whole, twice or thrice a day; and in pills, united with soap or calomel, from grs. xv. to ℈j. Of the juice, ʒss. is given for a dose in any proper vehicle.[2]

An over dose, or the too liberal use of it as a condiment, is apt to occasion headache, flatulence, thirst, fever, inflammation, and discharges of blood from the hæmorrhoidal vessels.

3. ALLIUM CEPA.[3]

Officinal. ALLIUM CEPA, *Dub.* The bulb of the Onion. *Bulbus.*

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[1] *Journ de Pharm.* No. viii. p. 357.

[2] Its use as a condiment is of great antiquity. Thus, when the Israelites remembered the flesh-pots of Egypt, among other deprivations, which the malcontents enumerated, were "the leeks, and the onions, and the garlick." Numbers, c. xi. v. 5.

[3] Κρόμυον Dioscoridis. The specific appellation is derived from *caput*, a head, on account of the form of its bulb.

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Syn. Ognon (*F.*), Zwiebel (*G.*), Uijen (*Dutch*), Cipolla (*I.*), Cebolla (*S.*), Cebola (*Port.*), Lögen (*Dan.*), Rödlök (*Swed.*), Cebula (*Pol.*), Luck (*Russian*), Vungayum (*Tam.*), Loong (*Cyng*), Pecaz (*Pers.*), Bavangmera (*Malay*), Palandoo (*Sam.*), Pecáj (*H.*), Bassul (*A.*), Kanda (*Sans.*), Brangbang (*Jav.*), L'Vussel (*Bernouse*), Bussara (*Begharmi*).

The onion is a perennial, bulbiferous plant, cultivated all over Europe for culinary purposes: flowering in June. It is so well known, as scarcely to require a particular description. The bulb is simple, formed of concentric circles, with a radical plate at the base, and fibrous roots. The stem is a naked, swelling scape, with fistular, pointed, spreading leaves, sheathing at the base. The flowers are produced in a capital or head, enclosed in a deciduous spathe.

Qualities.—The odour and taste of the onion do not materially differ from those of garlic, but are much weaker. A little acrid, volatile, essential oil, combined with sulphur[1], is obtained by distillation; and the recent juice contains sugar, mucus, phosphoric acid, phosphate of lime, and citrate of lime.[2]

Medical properties and uses.—The onion, "considered as an article of food, when eaten liberally, is said to produce flatulencies, occasion thirst, headache, and turbulent dreams." As a medicine it is stimulant, diuretic, and expectorant, and may be used in the same cases as garlic. On account of the free phosphoric acid it contains, the juice is supposed to be useful in calculous cases, as it dissolves phosphate of lime out of the body. Onions are, however, scarcely ever employed, except externally, as suppurative cataplasms; for which purpose they are generally roasted, split, and applied to tumours.

ALOE. *Spec. Plant. Willd.* ii. 184.
Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. ord.* Liliaceæ.
G. 659. *Corolla* erect, mouth spreading, bottom nectariferous. *Filaments* inserted into the receptacle.
Species 2. Aloe *spicata.* Spiked Aloe.
——— 3. Aloe *vulgaris.* Common Aloe. *Sibthorp. Flor. Græc.*

1. ALOE SPICATA.[3]

Officinal. ALOE, *Lond.* ALOES EXTRACTUM, *Edin.* ALOE SOCOTORINA, *Dub.* Aloes. Extract of Aloes.

Syn. Suc d'Aloes (*F.*), Glausinde Aloe (*G.*), Azevre Succorrina (*Portug.*), Aloe (*I.*), Aloe (*S.*), De doorblädige Aloe (*Belg.*), Aloe (*Russian*), Elwa (*H.*), Sibber (*Pers.*), Musebber (*A.*), Corriabolum (*Tam.*).

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[1] It is this sulphureted oil which blackens silver plate in which onions are placed, and which occasions the disagreeable odour of this bulb in putrefying.

[2] Fourcroy and Vauquelin, *Ann. de Chym.* lxv. 161.

[3] Ἀλόη Dioscoridis? It is probable, from the researches of Dr. Sibthorpe, that the only aloe of the ancients, medicinally used, was the A. vulgaris.

The spiked aloe is undoubtedly the species which yields the best extract brought from the Cape of Good Hope; and it is also supposed to yield the extract brought from the island of Zocotora; which was formerly the only place of export for the best aloes, thence named Socotrine aloes. De Candolle, however, refers it to a distinct species, which he terms Aloe Socotorina. It grows abundantly in the interior of the Cape, particularly at Zwellendam, near Mossel Bay; and in the kingdom of Melinda, whence the best aloes are brought. The stem is round, about four inches in diameter, leafy at the top, and rising three or four feet in height. The leaves are spreading, about two feet long, subverticillate, broad at the base, gradually drawn to a point, channelled, acute, with remote teeth. The flowers spread horizontally, in very close spikes. Under each flower is a single ovate, acute, broad, membranaceous bracte, white, with three green streaks, and a little shorter than the corolla. This is bell-shaped, and six-petalled: the three inner segments are white, marked with three green lines, not connected together, ovate, blunt, and broader than the three outer; which are connected with them at the base, and resemble them, but are narrower and less concave. The flower contains a large portion of a purple honey-juice. The seeds, which are numerous, with a membranaceous appendage attached to each, are contained in a superior capsule.

At the island of Zocotora the leaves are cut off close to the stem, then cut in pieces, and the juice allowed to run out: this is allowed to remain at rest for forty-eight hours, during which time a feculent matter is deposited: after which the supernatant liquor is poured off into flat dishes, and evaporated in the sun. At Zwellendam, in the month of July, the leaves are pulled, then cut into pieces, the juice expressed, and inspissated by means of heat.

The real Socotrine aloes, which are now scarce in the market, and which come from the island of Socotora, or Zocotora[1], near the Straits of Babelmandel, are brought to this country, by way of Smyrna and Malta, in chests and casks. Those from the Cape are brought in similar packages. The greater part of what are now sold as Socotrine aloes are brought from Bombay. The Bombay aloes are rather duller and browner, but in other respects have nearly the same characters as the Socotrine, which are sometimes mixed with the Indian. They are imported in casks containing from two to eight hundred weight, and sometimes in skins.[2]

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[1] Zocotora is an island subject to the Prince of Hadecamaut, an Arabian province contiguous to Yemen.

[2] Mr. Barrow states, that the quantity of Cape aloes sent to London, from 1799 to 1802 inclusive, was 341,927 lbs. Vide *Travels in Africa.*

Qualities.—The real *Socotrine* aloes have a peculiar aromatic odour, not unlike that of the russet apple decaying, which is developed when the specimen is breathed upon: the taste is a very permanent intense bitter. It is in pieces of a mottled colour; namely, reddish yellow mixed with brown, glossy as if varnished: breaking with a smooth conchoidal fracture. The thin edges and small fragments are reddish, or golden yellow, and semi-transparent. It softens in the hand, and is adhesive; yet it is sufficiently pulverulent; and the powder has a bright golden yellow hue.

The *Cape* aloes have a stronger and more disagreeable odour than the Socotrine or Hepatic, for what is sold as Socotrine consists of the finest specimens of the Hepatic: the taste is nearly the same. The outside of the pieces is more friable, has more of a yellow cast, and is less glossy; but the inside is apt to continue soft and pliable. The colour of the powder is a beautiful greenish yellow, resembling gamboge, but less bright. They are imported in chests and casks.

2. ALOE VULGARIS.[1]

Officinal. ALOE HEPATICA; EXTRACTUM, *Edin.* ALOE HEPATICA, *Dub.* Extract of the Common Aloe, or Barbadoes Aloes.

The British Pharmacopœias formerly considered the plant which yields the Barbadoes aloes as a variety of the aloe *perfoliata;* but Sir E. Smith, the learned editor of Sibthorpe's *Flora Græca,* has marked the above-named plant, which is a distinct species, as the one that Sloane describes, in his History of Jamaica, as producing the Barbadoes extract.

The month of March is the period for cutting the aloes in the island of Barbadoes. The leaves are cut off close to the stem, and disposed in tubs, in such a manner that the juice runs out. After a sufficient quantity of it is collected, it is exposed to a heat in copper boilers; and, as it becomes more inspissated by a constant and regular fire, it is ladled from one boiler to another, and fresh juice added, until that in the last, which is called the *teache,* acquires the consistence of honey; when it is poured into calabashes, and hardens by age. It is brought home in these calabashes, or large gourd-shells, each of which contains from sixty to seventy pounds weight. They are often passed off as Socotrine aloes.

There is still another kind of aloes, named Fœtid or Caballine, but on account of its fœtid odour it is not used in medicine. A Mocha aloe resembling the Cape, but less purgative, is also brought to this country.

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[1] Ἀλόη Dioscoridis, l. 3. c. 25.

Qualities.—The odour of the Barbadoes aloes is stronger and less pleasant than that of the Socotrine, and has some resemblance to the odour of the human axilla. The taste is nauseous and intensely bitter. The pieces are also of a duller and deeper brown colour, less glossy, not so smooth in the fracture, but they easily splinter. The edges are not so sharp and transparent; but rather blunt, and of a dull yellowish hue. It softens in the hand, and is adhesive. The colour of the powder is a dull olive yellow. The Barbadoes are chiefly used as horse medicines.

All the kinds of aloes, when analysed, yield a small portion of vegetable mucus and resin, and a peculiar extractive matter. Braconnot found aloes to consist of 73 per cent. of a peculiar bitter matter, which he has termed the resinous bitter principle[1], *resino amer;* and 26 of a pure coloured principle, *principe pure:* Bouillon, Lagrange, and Vogel consider that aloes contain both resino-extractive and a resinous principle, in the proportion of 58 of the former and 42 of the latter. The odour, taste, and medical virtues of the drug reside chiefly in the extractive; and the superiority of the Socotrine, the Cape, and the Bombay aloes, is correctly supposed to arise from their containing a larger proportion of it, and consequently less resin, than the Barbadoes. Boiling water dissolves nearly the whole of any of the kinds; but as the solution cools, a portion is deposited; and by boiling aloes in water the extractive is altered, rendered insoluble in water, and approaches in its properties to the nature of resin. The alkalies and their carbonates greatly assist its solution. All the kinds dissolve, also, in proof spirit. When the Socotrine aloe is distilled, a volatile oil is obtained, which is not procured from the Barbadoes; but Trommsdorff found albumen in this variety, and not in the Socotrine aloes. Pfaff examined the extractive, which he calls *Aloesin,* and ascertained the following effects of re-agents on it:—It is soluble in water and alcohol, insoluble in ether. It imparts a bluish green colour to litmus paper reddened by an acid. It is deepened in colour by alkalies, rendered paler by acids, and clarified by alum. It is precipitated by protonitrate of mercury and acetate of lead; and scantily by nitrate of silver and nitrate of lead. Persulphate of iron deepens the colour of the solution, but throws down no precipitate. It is not affected by tincture of galls, muriate of tin, tartar emetic, or solutions of the salts of copper, zinc, or manganese. By distilling eight parts of nitric acid on one part of aloes, and washing the residue with water, a

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[1] *Ann. de Chymie,* lv. 152.

reddish yellow precipitate is formed, which, when washed and dried, falls into a beautiful golden yellow powder. This is the bitter principle of aloes; and, according to the experiments of M. Leibeg, it is a compound of carbazotic acid and a resinous principle. This *bitter principle* has been supposed to be the active cathartic principle of aloes; but this requires confirmation. It forms a beautiful purple dye.

Medical properties and uses.—Although all these kinds of aloes differ in their sensible qualities, yet they agree in their medical properties. They are warm, stimulating cathartics, of slow solution; they act chiefly on the colon and rectum. By the extension of their stimulus to the uterine vessels, they produce, also, emmenagogue effects. Their operation is slow and moderate, but certain. From the stimulant property of aloes, they are useful in cases where the intestines are in a sluggish, relaxed, and insensible state, attended with viscidity of the abdominal secretions; as in the habitual costiveness of the sedentary and hypochondriacal, or that arising from a paucity of bile, in jaundice, chlorosis, and scrofula: and as the rectum participates in their action on the colon, they have been found very serviceable in expelling ascarides. Their effect upon the rectum is more owing to the manner of prescribing the remedy, than any specific action which it exerts on that portion of the intestines, which is but little affected when the aloes are prescribed in a soluble form. They are generally thought to be improper in very irritable and plethoric constitutions, in phthisis pulmonalis, and during the flow of the menses. Aloes and aloetic compounds have been likewise regarded as improper in pregnancy; but Dr. Denman has justly remarked, that "they are in common use among the lower class of people, because they are cheap, and conveniently given in the form of pills[1];" and no bad effects are observed to follow.

Aloes may be given in substance, in doses from grs. ij. to grs. x., larger doses not operating more effectually. Whether in the simple state, or when compounded with soap, bitters, metallic salts, and other substances, the form of pill is to be preferred, on account of the nauseous taste of the medicine.[2]

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1 *Introduction to Midwifery*, vol. i. 287.

2 Dr. Paris (see *Pharmacologia*) has enumerated the following empirical preparations as owing their efficacy chiefly to the aloes they contain. *Anderson's pills*, consisting of aloes, jalap, and oil of aniseed; *Hooper's pills*, formed of Pil. Aloes c. Myrrha, sulphate of iron, and Canella bark; *Dixon's antibilious pills*, a compound of aloes, scammony, rhubarb, and tartar emetic; *Speediman's pills*, of aloes, myrrh, rhubarb, the extract and the essential oil of chamomile; and *Lady Webster's dinner pills*, for which the following is the formula, extracted from the old Paris codex. ℞. Aloes optimæ, ʒ vj. mastiches, et rosarum rubrarum, āā ʒ ij. syrupi de absinthio q.s. ut fiat massa, in pilulas 120 dividenda.

Officinal preparations.—*Pulvis Aloes comp.* L. D. *Pulv. Aloës cum Canella,* D. *Pilulæ Aloeticæ,* E. *Pil. Aloes comp.* L. D. *Pil. Aloes cum Myrrha,* L. E. D. *Pilul. Aloes et Assafœtidæ,* E. D. *Pilulæ Cambogiæ comp.* L. E. D. *Pil. Aloes cum Colocynthide,* E. *Pil. Rhei comp.* L. E. *Pil. Sagapeni comp.* L. *Pil. Scammonii comp. cum Aloe,* D. *Extractum Aloës purificatum,* L. *Extractum Aloes,* D. *Pilulæ Colocynthidis comp.* D. *Tinctura Aloes,* L. E. D. *Tinct. Aloes comp.* L. E. D. *Tinct. Aloes ætherea,* E. *Tinct. Benzoini comp.* L. E. D. *Tinct. Rhei et Aloes,* E. *Vinum Aloes,* L. E. D. *Decoctum Aloes comp.* L. D.

ALPINIA. *Roxburgh. Plant. Corom.*

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Scitamineæ.

Species. A. *Cardamomum.*[1] The Cardamom-tree. *Van. Rheede* (Elettari). *Hort. Malabar.* vol. ix. *t.* 4, 5. *Linnæan Trans.* vol. x. part 2d. *Roxburgh, Ind.* p. 3. N. 226. *Asiatic Res.* vol. xi. p. 335.

Officinal. CARDAMOMUM, *Lond.* AMOMI REPENTIS SEMINA, *Edin.* AMOMUM CARDAMOMUM; SEMINA, *Dub.* Lesser Cardamom-seeds.

Syn. Petit Cardamome (*F.*), Kleine Kardamomen (*G.*), Kardamom (*Dutch*), Kadamome (*Dan*), Kardemumma (*Swed.*), Amomo minore (*I*), Cardamomo (*S. & Port.*), Kardamome (*Russian*), Kákula (*Arab.*), Purbi and Guzrate Cláchi (*H.*), Ela (*San.*), Kapol (*Javanese*), Yaylersie (*Tam.*), Capulaga (*Malay*), Pooah (*Sumatra*).

The plant which produces these seeds is a native of India, growing on the mountains above Cochin and Calicut; in shady places, on the declivities, and in the valleys. It is properly referred by Dr. Roxburgh to the genus *Alpinia.* The cultivated plant does not flower till it is four years old. It rises twelve feet in height. The root is an oblong, jointed, tortuous tuber, of a whitish colour, and sending off numerous fibres. The stems, which emerge from the root, are simple stripes, like a reed, round, smooth, and the thickness of the human thumb. The leaves are alternate and sheathing, ellipticolinear, about two feet and a half, and sometimes twelve feet in height, from four inches to two feet in length; broad, green, and striated with parallel veins, and having a strong sub-acrid, aromatic taste and odour. The midrib of the leaf, on the upper surface, is pale green; on the under a much deeper green. The flowers are in racemes, which are sent off from the rhizome or underground stem; creep along the ground; and are furnished with oblong leaflets like capsules. The calyx is monophyllous, inferior, small, and divided into three obtuse teeth at the margin: the corolla is monopetalous, tubular, and four-cleft, the three outer segments being long, narrow, and of a straw-colour, and the central one is white,

[1] καρδάμωμον Hippocratis.

tipped with pink, large, broad, concave, and irregularly oval. The filament is broad, slightly grooved, supporting a large, double, emarginate, crestless anther, having a deep fissure between its lobes, to receive the style, which is slender, and bearing a funnel-shaped ciliated stigma. The capsule is a fleshy smooth pericarp, and trilocular, containing eighteen to twenty-seven hard, horny, obtusely wedge-shaped seeds.

The ripe fruit is gathered in November; and the capsules, which are dried in the sun, or over a gentle and slow fire, change as they dry from green to a whitish straw colour, and become thinner in the bark: whilst the permanent calyx and foot-stalk is detached by rubbing them between the hands.[1] A rainy season is fatal to the crops, owing to the racemes lying on the ground.

Three species of this genus are known: but that which is above described yields the officinal cardamoms. They are brought to this country in the Bengal ships in cases, each containing about 120 lbs. weight. For the purpose of preserving them, they are kept in the capsules, which are small, triangular, striated, and of a pale, clear straw-colour.

Qualities.—Cardamom seeds have an agreeable aromatic odour, and warm spicy taste. They are easily separated from the capsule; and are of a brown colour, angular, corrugated, and pulverulent. Water, alcohol, and ether, extract their virtues; the two latter most completely. The watery infusion has a turbid appearance; and lets fall a flocculent precipitate, on the addition of alcohol, the acids, solutions of sulphate of iron, muriate of mercury, and acetate of lead; but the sulphate of iron does not alter its colour. The alcoholic tincture is rendered milky by water. The ethereal has a yellowish green hue, and, when evaporated on the surface of water, leaves neither resin nor extractive, but a considerable portion of essential oil, which has the flavour and taste of the seeds in perfection. Cardamoms, therefore, seem to be entirely composed of fecula, mucus, and essential oil.

Medical properties and uses.—Cardamom seeds are carminative and stomachic. They are less stimulating than pepper: and are therefore used, united with rhubarb and magnesia, in the flatulent colic of children; and as a grateful addition to bitters in dyspeptic and gouty affections of the stomach: but they are principally employed to give warmth to other remedies.

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1 In gathering the fruit, the fruit panicles are plucked up by the roots; and the pods, being stripped through the fingers, are sorted into three classes: 1. Valli Kai, or head fruit; 2. Nadu Kai, middle fruit; 3 Poulo Kai, abortive fruit.—*Linn. Trans.* x. p. 229.

The dose in powder is from grs. vj. to ℈j.

Officinal preparations.—*Extractum Colocynthidis compositum,* L. D. *Tinctura Cardamomi,* L. E. D. *Tinct. Cardamomi composita,* L. D. *Tinct. Cinnamomi composita,* L. E. *Tinct. Conii,* L. *Tinct. Gentianæ composita,* L. D. *Tinct. Rhei,* E. D. *Tinct. Rhei cum Aloe,* E. *Tinct. Sennæ,* L. D. *Spiritus Ether. aromat.,* L. *Vinum Aloes Soccot.,* E. *Confectio aromatica,* L. D. *Pulvis Cinnamomi comp.,* E. *Pilulæ Scilliticæ,* E. *Pilulæ Scillæ composita,* D. *Infusum Sennæ compositum,* D.

ALTHÆA.[1] *Spec. Plant. Willd.* iii. 770.

Cl. 16. *Ord.* 8. Monadelphia Polyandria. *Nat. ord.* Malvaceæ.

G. 1289. *Cal.* double; the exterior 6 or 9 cleft. *Caps.* numerous, 1-seeded.

Sp. 1. A. *officinalis.* Common Marsh Mallow. *Med. Bot. 3d edit.* 552. *t.* 198. *Eng. Bot. t.* 147. *Smith's Flora Britan.* 3. 739.

Officinal. ALTHÆÆ FOLIA, ET RADIX, *Lond.*—RADIX, *Edin.*—FOLIA ET RADIX, *Dub.* The leaves and root of Marsh Mallow.

Syn. Guimauve (*F.*), Eibisch wurzel (*G.*), Gemeene heemst (*Belg.*), Ibisk (*Danish*), Alte (*Swed.*), Slaz wielkilesny (*Polish*), Proswurujak (*Russian*), Altea, Malva visco (*I.*), Malvarisco (*S.*).

The marsh mallow is an indigenous plant, which grows, as its name imports, in marshy places, particularly salt marshes, and on the banks of rivers throughout Europe. It flowers in June and July, and ripens its seeds in September. The root is perennial and fusiform. The stems are annual, herbaceous, upright, rising from two to five feet in height, round, naked, and purplish below, but leafy, branching, and greenish above. The leaves are alternate and petiolate, longer than they are broad, slightly five-lobed, and unequally serrated: both surfaces are downy, and give a soft velvety feeling when rubbed between the fingers. From the axillæ of the leaves the flowers spring in short thick panicles. Both the calyxes are persistent: the exterior has 7, 9, 10, or 12 very narrow unequal divisions: the interior is more regularly, but less deeply, cleft into five broader and sharper segments. The petals are five, cordate, coalescing at their bases, of a pale blush colour. The stamens are many, united at their bases into a tube, and support reniform anthers. The germen is orbicular, bearing a cylindrical style, divided into many stigmas, which rise above the anthers. The capsules, generally about twenty in number, are of a rounded kidney shape, united laterally in a circle, so as to form a flattened wheel-shaped seed-vessel; and each contains a solitary, reniform, flattened, smooth, brown seed. The roots, which are also medicinally used, are dug up in autumn.

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[1] Ἀλθαία Dioscoridis. Named from Althea, the mother of Meleager.

Qualities.—The leaves of the marsh mallow are inodorous and mucilaginous when chewed; the roots are externally tough and of a yellowish colour, internally white and fibrous; and contain a very considerable portion of mucus, which is yielded to water by coction. It also contains asparagine.

Medical Use.—The preparations of this plant, which derive their virtues from its mucus, are useful demulcents in visceral inflammations and calculous complaints. The roots, well boiled, and bruised, are sometimes used as an emollient suppurative cataplasm; and a decoction of the leaves forms a useful fomentation in external abrasions, and in cutaneous eruptions accompanied with a sharp ichorous discharge.

Officinal preparations.—*Decoctum Althææ officinalis*, E. *Decoctum Althææ*, D. *Syrupus Althææ*, L. E.

ALUMEN. *Lond. Edinb. Dub.* Alum.

Syn. Alum (*F.*), Alaun (*G.*), Aluin (*Dutch*), Aluin (*Dan. Swed.*), Halun (*Polish*), Kevaszu (*Russ.*), Allume (*I.*), Alumbre (*S.*), Pedrathume (*Portug.*), Sp'hatica (*San.*), P'hitcari (*H.*), Shcb (*Arab.*), Paddicarum (*Tam.*)

This salt is a compound of alumina, potassa, and sulphuric acid, a double sulphate of alumina and potassa. It is found native in some places, either effloresced on bituminous schistus, as at Göttwig in Austria; or united with the soil in volcanic regions, as at the Solfatara near Naples, where the only processes requisite for its extraction are lixiviation and evaporation.[1] But the greater quantity of the alum of commerce is prepared by a peculiar management of schistose pyritic clays, usually denominated alum ores. At La Tolfa, near Civita Vecchia, where the best Roman alum is made, the ore is *alum stone* or sulphureted clay, found in large stratified masses among compact iron-shot argillaceous limestone[2]; but at other places, both on the Continent and in Great Britain, it is manufactured from *pyritaceous clay*, which is in black, hard, brittle masses; *volcanic aluminous ores*, a white saline earth; *shale alum slate*, which occurs amorphous, or in concentric balls. At Hurlett and Nitshill near Paisley, the largest alum mine in this country, the schistus lies ten inches thick above coal. But the alum is in every instance the result of the decomposition of what is termed its ore, and a subsequent synthetical union of its components.

To prepare the alum, the slate is roasted and properly exposed to the atmosphere, when the sulphur of the sulphuret of iron, present in it, is oxidized by the air and converted

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[1] These processes are performed in pans sunk in the ground, the heat of which is sufficient to carry on the evaporation.

[2] An alum is found near Moscow which contains much sulphate of iron. *Mém. de la Soc. Imp. de Moscow*, t. i. p. 22.

into sulphuric acid, which, combining with the alumina and potassa present in the slate, produces an aluminous efflorescence. In general, however, the slate is first calcined with a low heat, so as to destroy the bituminous matter, and partly convert the sulphur into sulphuric acid; the oxidizement is then completed by exposing the roasted slate to air and moisture, by which means a super-sulphate of alumina is formed, which is extracted by lixiviation. To the solution, concentrated until it acquire the spec. grav. 1·35, is added, when the slate contains no potassa, either impure subcarbonate of potassa of commerce, or super-sulphate of potassa, or putrid urine, or muriate of potassa, after which it is run into coolers to be crystallized. At the end of four days the mother waters are drained off, and the crystals, being washed, are re-dissolved in boiling water to saturation, and then *roched,* that is, run into casks. On taking asunder the casks at the end of sixteen days, the alum exteriorly is found in a solid cake, but interiorly crystallized in large octahedral pyramids, inserted into one another.

The ancients were probably unacquainted with alum, for the στυπτηρία of the Greeks, and the *alumen* of the Romans, were merely vitriolic earths: and the first regular alum-works appear to have been established by the Asiatics, in the middle ages, particularly at Roccha, in Syria, whence probably was derived the name *Roch alum;* and from them Europe was supplied till the fifteenth century. After this period, works were begun at Tolfa and Volterra in Italy, at Oberkaufungen and several other places in Germany, and at Almacoran in Spain. In England, in the reign of Elizabeth, Sir Thomas Chaloner established the first alum-work at Gisborough, in Yorkshire. The largest alum-works at present in this country are those on the estate of Lord Glasgow at Hurlett, and those of Lords Dundas and Mulgrave at Whitby, in Yorkshire.[1]

The best alum is the Roman, which is in irregular octahedral, crystalline masses, powdery on the surface. The English is in large, irregular, semitransparent, colourless masses, having a glassy fracture, not efflorescent, and difficult to pulverize; and that from the Levant, or Roccha alum, is in small morsels, about the size of an almond, rather friable, and of a pale rose colour. The form of the regular crystal of alum is an octahedron.

Qualities.—Alum is inodorous, and has a sweetish, acidulous, astringent taste. Its specific gravity is about 1·71. It

[1] The alum works at Whitby were established in 1600. The ore is alum slate; the stratum is twenty-eight miles; and the cliffs are from 100 to 750 feet in height. One hundred and thirty parts of the calcined slate yield one part of alum.

reddens litmus and tincture of cabbage[1]; is in a small degree efflorescent; and soluble in five parts of water at 60°, and in its weight of boiling water. When exposed to a gentle heat, it undergoes the watery fusion, and in a stronger heat swells, loses 50 per cent. of its weight, which is water, and becomes an opaque, white, friable, spongy mass. It is decomposed by the alkalies and alkaline earths, which attract the greater part of its acid, and precipitate the alumina united with a small portion of acid and potassa. According to Vauquelin, its constituents are, — acid 30·52, alumina 10·50, potassa 10·40, and water 48·58, in 100 parts: but by a more recent analysis, Berzelius makes them — sulphate of alumina 36·85, sulphate of potassa 18·15, and water 45. According to the analysis of Mr. R. Phillips, it is composed of sulphuric acid 34·94 parts, alumina 11·18, potassa 10·33, and water 43·55, in 100 parts. In the crystallized state its equivalent is 474·95, or 1 equiv. of alumina = 51·4; 1 of potassa = 47·15; 4 of sulphuric acid = 160·4; and 24 of water = 216. It often contains ammonia, and none of the alum of commerce is wholly free from traces of iron. Gallic acid precipitates the earth of alum: the alkalies and their carbonates, muriate of ammonia, magnesia, lime, salts of baryta, phosphates, carbonate of magnesia, chalk, tartrate of potassa, and infusions of galls and of cinchona, are incompatible in prescriptions with solutions of alum; as are also acetate of lead, and the salts of mercury. The alumina thrown down by ammonia or potassa is re-dissolved by an excess of the alkalies.

Medical properties and uses.—Alum is a powerful astringent. It is used both as an internal and external remedy for restraining violent hæmorrhages; and also in cases of obstinate diarrhœa, diabetes, and fluor albus; but we agree with Dr. Cullen, that it is not to be depended upon in the two latter diseases. It has been given as an auxiliary to cinchona in intermittents, and in confluent small-pox, when the pustules are bloody; and Dr. Percival regarded it as a prophylactic in colica pictonum, and a cure for slighter cases.[2] It is used locally in gargles, in cases of cynanche, relaxation of the uvula, and aphthæ; and as the basis of injections, in cases of gleet and leucorrhœa, and of eye-waters in chronic ophthalmia.

The dose in hæmorrhages is from grs. v. to ℈j., repeated every hour or two hours, till the bleeding abate: in other cases, smaller doses are more advisable, larger being apt to nauseate

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[1] Much of the English alum which we have examined strikes a green with syrup of violets, and most other vegetable colours, with the exception of the two above mentioned.

[2] *Observations on Lead,* &c.

the stomach, and occasion violent constipation. The addition, however, of an aromatic prevents it to a certain degree from exciting nausea. It is sometimes administered dissolved in the serum of milk, in the form of whey (*serum lactis aluminosum*), which is prepared by boiling ʒij. of powdered alum in a pint of milk, and straining. A small piece of alum, briskly agitated with the white of an egg, forms a coagulum, which, applied between two pieces of gauze or thin rag, proves very serviceable in ecchymosis of the eye, and in some species of ophthalmia. The dose of the whey is f ℥ij. to f ℥iij.

Officinal preparations.—*Alumen siccatum*, E. D. *Liquor Aluminis comp.* L. *Pulvis Aluminis comp.* E.

AMMONIÆ HYDROCHLORAS, *Lond.* AMMONIÆ MURIAS, *Dub.* MURIAS AMMONIÆ, *Edin.* Hydrochlorate or Muriate of Ammonia.

Syn. Sel Ammoniac (*F.*), Salmaik (*G.*), Salmiaken (*Dan. Swed.*), Sale Ammoniaco (*I.*), Sal Armoniaco (*S.*), Nosader (*H.*), Navacharum (*Tam.*), Urmiena (*Arab.*), Nowshader (*Pers.*), Vayvagarra Loonoo (*Cyng.*), Nuosadur (*Sans.*)

This salt, which is a compound of muriatic acid and ammonia, is found as a product of volcanoes[1]; but the greater part of that which is employed in medicine and the arts is artificially prepared.

Hydrochlorate of ammonia was originally manufactured in Egypt, by sublimation from the soot of fuel, formed by the dung of phytivorous animals, kneaded with straw into clods, and dried in the sun. From this source all the European states were formerly supplied; but since the manufacture of it in Europe, the importation of Egyptian sal ammoniac has been discontinued. The process differs in different places.[2]

Bones, chopped into small pieces, and boiled in order to extract the marrow and fat, are distilled from an iron cylindrical still into a leaden receiver, cooled by a refrigeratory, which is its cover, and contains about four inches in depth of water. Six parts of impure alkaline liquor and five of fœtid oil are thus procured; the oil is skimmed off, and the alkali mixed with pulverised gypsum. By double decomposition sulphate of ammonia and carbonate of lime are formed; the liquor which contains the former is then mixed with common salt (*chloride of sodium*); and thus, by a second decomposition, hydrochlorate of ammonia and sulphate of soda are formed in the liquor. This solution is clarified by subsidence and de-

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[1] The eruption of Etna in 1811 afforded as much sal ammoniac as supplied all the manufactories and apothecaries' shops in Sicily. *Annales de Mines*, tom. v. p. 135. It is exhaled, also, from the Solfatara of Pozzuola; from one of the great apertures of which it has been extracted for several years.

[2] *Aiken's Dictionary of Chymistry*, art. Sal ammoniac.

cantation; and by a skilfully managed evaporation in leaden boilers, the two salts are separated as they crystallize. The water of crystallization is then driven off from the hydrochlorate of ammonia, by exposing it to heat in a kind of oven; and the spongy, friable, ash-coloured mass, into which it changed, being put, while hot, into globular bottles, or glazed earthen jars furnished with a moveable perforated cover, the hydrochlorate is sublimed by exposing them to a heat of 320° in iron pots filled with sand. The cakes of salt produced, after being placed "for a day or two in a damp atmosphere," to soften their surface, and facilitate "the removal of any superficial impurities," are packed in casks for sale.

The cakes of hydrochlorate of ammonia are hemispherical, about two inches thick; elastic; and when broken, are towards the convex surface white, striated, and opaque; but towards the concave have a more crystallized appearance, and are nearly semitransparent. This salt is also, sometimes, crystallized in conical masses, that are deliquescent, owing to the presence of muriate of lime, which renders it unfit for medicinal purposes.

The greater part of the sal ammoniac in the London market is made in the north of England; but an inferior sort is imported in chests from the East Indies.

Qualities.—This salt is inodorous; has a salt, somewhat bitterish, cool taste; very slightly attracts moisture from the air; and has a specific gravity of 1·450. It is ductile, and therefore not very easily pulverized. It requires 3·25 times its weight of water at 60°, and its own weight at 212°, to dissolve it; and during its solution a great reduction of temperature takes place. It is also soluble in 4½ parts of alcohol. At a high temperature it sublimes without melting, and is unchanged. When dissolved in boiling-water, it forms, as the solution cools, in tetrahedral or in flaky plumose crystals. Its components are 31·5 per cent. of ammonia, and 68·5 of acid, independent of the water of crystallization; or 1 equiv. of acid = 36·42 + 1 ammonia = 17·15, making the equivalent 53·57. It combines unchanged with bichloride of mercury, and increases its solubility in water. The sulphuric and nitric acids unite with its alkali, and set free the muriatic acid. Potassa and its carbonate, carbonates of soda; lime, magnesia; the carbonate of baryta, lime, and carbonate of magnesia, combine with its acid, and set free the ammonia, which is rendered sensible by its odour. Acetate of lead, when added to a solution of it, throws down a precipitate of muriate of lead: it is decomposed also by nitrate of silver, the base of which forms an insoluble compound with hydrochloric acid:

hence these salts are incompatible in prescriptions with hydrochlorate of ammonia; but it may be combined in solution with the sulphate of copper, or of zinc.

Medical properties and uses.—This salt was formerly considered a powerful aperient and attenuant of viscid humours, acting as a diaphoretic, diuretic, purgative, and emetic, according to the mode of exhibition, or the extent of the dose; but it is now scarcely ever ordered as an internal medicine. Externally, it is advantageously employed, when mixed with its weight of nitre, and dissolved in eight parts of water, on account of the cold produced during its solution, to abate the pain and heat of inflammation and to allay violent headach. It is useful, also, in cases of mania, plethoric apoplexy, and injuries of the head, and to assist in the reduction of hernial tumours; but when it is employed for this purpose, the solution should be made immediately before applying it to the affected part. It is also a useful application in dropsy of the thyroid gland.[1] Owing to its stimulant qualities, it forms an excellent discutient, when dissolved in the proportion of ℥j. of the salt, in f ℥ix. of water with f ℥j. of alcohol, in indolent tumours, gangrene, scabies, and chilblains: in which cases it is better not to be too recently dissolved; and as a gargle, it is occasionally useful in cynanche. A plaster formed with ʒss. of the muriate, ℥j. of soap, and ʒij. of lead plaster, is highly recommended by Dr. Paris[2] as a rubefacient in pulmonary affections. Its efficacy depends on the extrication of ammonia by the decomposition of the hydrochlorate, on which account it should be renewed every twenty-four hours.

Officinal preparations.—*Ammoniæ sesquicarbonas,* L. *Ammoniæ subcarbonas,* E. *Ammoniæ carbonas,* D. *Liquor Ammoniæ Fortior,* L. *Liquor Ammoniæ,* L. *Aqua Ammoniæ,* E. D. *Hydrarg. Ammonio-chloridum,* L. *Ferri Ammonio-chloridum,* L. *Ferrum Ammoniatum,* E. *Alcohol Ammoniatum,* E. *Spiritus Ammoniæ,* L. D. *Spiritus Ammoniæ aromaticus,* L. *Aqua cupri ammoniati,* D. *Hydro-sulphuretum Ammoniæ,* D. *Ammoniæ bicarbonas,* D.

AMMONIÆ LIQUOR FORTIOR, *Lond.* Stronger Solution of Ammonia.

This solution of ammonia is usually prepared in a large way by the manufacturing chymists; the greater part of that brought into the London market is made by Messrs. Howards. The materials, namely, hydrochlorate of ammonia and lime, are introduced into cast-iron pots, fitted with copper heads, which communicate with glass receivers containing water equal to the weight of the hydrochlorate employed. The gaseous ammonia which results from the decomposition of the

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[1] *Burns on the Anat. of the Neck,* p. 191. [2] *Pharmacologia.*

hydrochlorate is absorbed by the water, whilst chloride of calcium and lime remain in the iron pot.

Qualities.—This solution of ammonia is colourless, most powerfully pungent, and possessing in an eminent degree all the properties of pure ammonia. At the sp. gr. 882, it contains about twenty-nine per cent. of real ammonia. It is strongly alkaline; boils at 130° Fahr. and forms a gelatinous mass when it is cooled down to 40° below zero. It should mix without becoming turbid with lime water; nor should a precipitate be thrown down by the solution of nitrate of silver.

Medical properties and uses.—This strong solution is never employed except to raise an immediate blister, which it effects in a few seconds, if a piece of calico or of bibulous paper moistened with it be applied to the skin. It is chiefly employed by the retail druggists for preparing the *Liquor Ammoniæ* of a strength equal to that of the Pharmacopœia; for which purpose one fluid ounce of it is mixed with three fluid ounces of distilled water.

AMMONI'ACUM. Vide *Dorema Ammoniacum.*

AMY'GDALUS. *Species Plant. Willd.* ii. 982.

Cl. 12. *Ord.* 1. A. Icosandria Monogynia. *Nat. ord.* Amygdaleæ.
G. 981. *Cal.* 5 cleft, inferior, *Pet.* 5. *Drupe* with a nut perforated.
1. A. *Persica* The Peach-tree.
2. A. *communis.*[1] The common Almond-tree. *Med. Bot.* 3d *edit. t.* 183.

Varieties. β. Amygdalus *dulcis.* Sweet Almond-tree.
———— γ. Amygdalus *amarus.* Bitter Almond-tree.

1. AMYGDALUS PERSICA.

Officinal. AMYGDALUS PERSICA. *Folia. Dub.* Leaves of the Peach-tree.

The peach-tree is a native of Persia; at least there is reason to think so from the name. It resembles the Almond-tree in its general physiognomy; it is small, with spreading branches; the flowers appear before the leaves; they are sessile, of a delicate rose-colour. The leaves are alternate, lanceolate, narrow, pointed, serrated; dark green above, and of a glaucous or pale green on the under disk. The fruit is round, having a deep furrow on one side, with a delicate, downy cuticle when ripe.

In America the peach is very abundant; requiring little or no culture. It was cultivated in England prior to 1557.

Qualities.—The leaves of the peach-tree, when bruised, exhale an agreeable odour, and contain hydrocyanic acid in considerable abundance.

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[1] Πάδος Theophrasti.

Medical properties and uses.—The same as those of the bitter almond, and of the leaves of the Prunus Lauro-Cerasus, to which we refer our readers.

2. AMYGDALUS COMMUNIS.

Officinal AMYGDALA AMARA.—AMARÆ, DULCIS, AMYGDALÆ OLEUM, *Lond.* AMYGDALUS COMMUNIS, NUCLEI, *Edin.* AMYGDALÆ AMARÆ, DULCES, *Dub.* Bitter and sweet almonds.

Syn. Amandes douces et ameres (*F.*), Bittere und Süsse Mandeln (*G.*), Amandel (*Dutch*), Mandel (*Dan. Swed.*), Migdalowe (*Polish*), Mandorli dolce ed amare (*I.*), Almendra (*S.*), Amendo (*Portug.*), Bādāmie Parsie (*Hind. Pers.*), Lowz (*A.*), Parise Vadomcotta (*Tam.*), Lonzan (*Malay*).

The almond-tree is a native of Syria and Barbary; but it is now naturalized in the South of Europe, and even in England[1]; where, however, the fruit seldom ripens. The flowers display themselves in March and April, before the leaves are expanded. It rises to the height of twenty feet, and divides into many spreading branches, which are covered with a dark gray bark. The leaves stand upon short foot-stalks, are about three inches long, and three fourths of an inch broad, elliptical, pointed at both ends, minutely serrated, with the lower serratures glandular, and of a bright green colour. The flowers, which are supported on very short peduncles, are of a pale rose or blush colour, varying to white; the calyx is tubular, with the lip divided into five blunt segments; the petals are five, oval, and convex; the filaments about thirty, inserted into the calyx, tapering, spreading, of unequal lengths, and furnished with orange-coloured, simple anthers; the germen is downy, with a simple style, supporting a round stigma. The fruit is of the Peach kind, but flatter, with a tough coriaceous covering instead of the rich pulp of the Peach: opens spontaneously at the longitudinal furrow when ripe. The kernel or almond, which is enclosed in a tender, thick, brittle, spongy shell, is oblong, flattish, rounded at one end, and pointed at the other, and composed of two white cotyledons enveloped with a thin, pale brown, veined, bitter skin, covered with an acrid meal.

The two varieties of the amygdalus *communis* are not distinguished from each other but by the taste of the kernel of their fruit. The *Valentia* almond is a sweet, large, flat almond, pointed at one extremity, and compressed in the middle as if with the thumb. The *Italian* is not so sweet, is smaller, and less depressed in the middle. The *Jordan* almonds, which come from Malaga, and are the best sweet

[1] It was cultivated in England by Lobel before 1570.

almonds brought to England, are said to be the produce of a distinct species of amygdalus. They are longer, flatter, less pointed at one end, and less round at the other, and have a paler cuticle than those which we have described.

Sweet almonds are imported in mats, casks, and cases: the bitter, which come chiefly from Mogadore, arrive in boxes.

When the almond is not well preserved, it is preyed on by an insect that eats out the internal part: or, if this does not happen, the oil it contains is apt to become rancid.

Qualities.—The cuticle of both kinds of almonds has an unpleasant, bitterish, austere taste; but it is easily detached by putting the almonds into boiling water. When thus decorticated, they are said to be blanched.

The blanched *sweet almond* is inodorous; has a sweet, pleasant, bland taste; and consists chiefly of fifty-four parts of fixed oil, three of gum, six of uncrystallizable saccharine matter, and twenty-four of albumen, a trace of acetic acid, and four parts of woody fibre. When eaten as food it is not very digestible, probably owing to the albumen; and requires to be well masticated. The *bitter-almond* is also inodorous when entire, but when triturated with water it has the odour of the peach-blossom; and the taste is the pleasant bitter of the peach kernel. It contains less fixed oil and more albumen than the sweet-almond; a volatile oil, and a portion of hydrocyanic acid, upon which its narcotic power is supposed to depend. The volatile oil of bitter almonds which contains hydrocyanic acid, is prepared from the cake remaining after the expression of the fixed oil, by submitting it to distillation with water. One hundred weight of the cake generally yields from two ounces to two and a half ounces of the volatile oil. From the experiments of Mr. Hennel it appears, that the hydrocyanic acid may be separated from this oil by digesting it with red oxide of mercury, which is converted into a cyanide. When this is done the oil still retains its odour of the peach-blossom, a proof that it does not depend on the hydrocyanic acid. Neither the volatile oil nor the hydrocyanic acid pre-exist in the bitter almond; both are developed by the action of water. From the experiments of Leibig and Wohler oil of bitter almonds appears to be a hyduret of benzule, and hydrocyanic acid.

When the ordinary oil of bitter almonds is distilled after strong agitation with a solution of pure potassa and protochloride of iron, the oil is obtained distinct from the hydrocyanic acid; and by a second distillation with pure, dry lime, it is freed from water. It is then a colourless, volatile, inflammable fluid, retaining the odour of the peach blossom, and having a burning aromatic taste: sparingly soluble in water: very soluble in alcohol. It is a compound of 1 eq. of benzule (C 14 H 5 O 2) + 1 eq. of hydrogen = 107·68.

The fixed oil, which both varieties of the almond yield by expression in large quantity, is insipid and inodorous, when heat has not been employed.

Medical properties and uses.—Sweet almonds are used more as food than as medicine; but they afford little nourishment. Heartburn is said to be relieved by eating six or eight of them decorticated. When triturated with water, milky mixtures or emulsions are formed, which have a close affinity in their chemical characters to animal milk, with this difference, that the albumen concretes by heat alone. Almonds are also used in pharmacy for assisting, by trituration, the combination of some substances, such as camphor, and the resins, with water. Bitter almonds are scarcely ever used medicinally, although Bergius[1] mentions a case of intermittent having been cured by them, when the Peruvian bark had failed; and reflecting on the effects which have been found to result from the use of the hydrocyanic acid, I have employed the bitter almond in pulmonary and dyspeptic affections, hooping cough, and asthmatic complaints, with the best success. As a local application, I have found the emulsion extremely beneficial when used as a lotion in acné rosacea, and in impetigo. Owing to a peculiar idiosyncracy of some habits, the smallest quantity of the bitter almond taken into the stomach produces urticaria, and other unpleasant effects.[2]

This variety of the almond is said to operate as a poison on dogs, cats, foxes, and some other animals, but not generally, except in large quantity, on the human species.[3] The distilled water, however, of the bitter-almond exerts an action not less deleterious than that of laurel water on the human frame; when taken to the extent of thirty drops, it produces vertigo, headach, or rather a sense of weight at the summit of the head, tinnitus aurium, dizziness of sight and vomiting: a drachm of it has killed a stout dog.[4] When a large dose is taken, a paralytic state of the extremities supervenes, the

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[1] *Mat. Med.* art. *Amygdalus.*

[2] Dr. Gregory, the distinguished author of the Conspectus Medicinæ Theoreticæ, was thus affected by bitter almonds. Many accidents have occurred from confectionary made with them.

[3] For instances of their poisonous influence on man, see Wepfer; *Cicutæ Aquaticæ Historia;* Coullon, *Recherches sur l'acide hydrocyanique;* and *Lond. Med. and Phys. Journ.* vol. lvii. p. 150.

[4] Much information on this subject may be obtained from the Works of Fodere, Langrish, Orfila, Heberden, Watson, and a recent Treatise on Hydrocyanic Acid by Dr. Granville.

pupil remains unalterably dilated, and the excitability of every organ of sense is diminished; indeed death almost instantly follows. In order to counteract its poisonous effects, when that can be done, we must have recourse to chlorine, both in solution taken into the stomach, and also in the gaseous state inhaled. This should be followed by diffusibles, as brandy and ammonia; or three or four spoonsful of oil of turpentine may be given at intervals of half an hour. The volatile oil of bitter almonds operates as a sedative; but although its sedative effects depend on the hydrocyanic acid which it contains, yet it differs in its action from that acid, probably owing to the stimulant property of the volatile oil with which the acid is combined in it. It has been given in the same cases as hydrocyanic acid; but as the dose cannot be so well regulated, it is a more dangerous remedy than that acid.

Officinal preparations.—*Oleum Amygdalæ*, E. D. *Mistura Amygdalæ*, L. *Mistura Amygdalarum*, D. *Emulsio Amygdalæ comp.* E. D. *Emulsio Acaciæ Arabicæ*, E. D. *Emulsio Camphoræ*, E. *Confectio Amygdalæ*, L.

A'MYLUM. Vide *Triticum hybernum*.

AMYRIS. *Spec. Plant. Willd.* ii. 333.

Cl. 8. *Ord.* 1. Octandria Monogynia. *Nat. ord.* Amyrideæ, *Juss.* *G.* 755. *Cal.* four-toothed. *Pet.* four oblong. *Stig.* four-cornered. *Berry* drupaceous.

Species 2. Amyris *Elemifera*. Elemi-tree.

——— 6. Amyris *Gileadensis*. Balsam of Gilead tree. *Med. Bot.* *3d edit.* 603. *t.* 214. *Bruce's Abyssinia*, vol. v. p. 16. t. 2. 3.

1. AMYRIS ELEMIFERA.

Officinal. ELEMI, *Lond.* ELEMI; RESINA, *Dub.* Elemi.

Syn. Eleme (*F. G. I.*), Goma de Limon (*S.*).

The Elemi tree, of the botanical characters of which we know very little, is a native of Carolina and the Brazils. It does not, according to Catesby, rise to a great height: and the trunk is small, and covered with a gray bark. The leaves are opposite, on foot-stalks; ternate, and sometimes pinnate; with stiff, pointed leaflets, of a bright green colour, shining, and downy underneath. The flowers are in terminal corymbs; small, white, with the petals inflex at the tips. The fruit is the size and figure of an olive.

The resin is obtained by making incisions in the bark in dry weather, and is left to dry in the sun as it exudes. It used to be brought from Turkey in long roundish cakes, wrapped in flag-leaves; but the elemi now brought comes in mats and chests, each containing from four to six pounds weight.

Qualities.—True elemi has a fragrant aromatic odour, not unlike that of fennel seeds, but stronger. The taste is very slightly bitter, and warm. The cakes are of a pale yellow colour, semi-transparent, brittle on the outside, soft and tenacious within, and very fusible. Spec. grav. 1·0182. When distilled with water, it affords $\frac{1}{16}$th of a thin pale-coloured essential oil, on which its fragrance and softness depend; and the residue is a brittle, inodorous resin. Alcohol dissolves the greater part of elemi; but a white, flaxy, inodorous matter remains, which is almost entirely soluble in water; hence we may consider the constituents of elemi to be gum, and an intimate combination of resin and essential oil. But no true elemi is now to be found in the shops.

Medical properties and uses.—This resin is stimulant, but is very rarely used as an internal remedy, being chiefly employed for forming the mild digestive ointment which bears its name.

Officinal preparations. *Unguentum Elemi*, D. *Unguentum Elemi*, L.

2. AMYRIS GILEADENSIS.[1]

Officinal. ——, RESINI LIQUIDA, *Edin.* Balsam of Gilead.

Syn. Balsamier de la Mecque (*F.*), Opobalsamo (*I.*), Balsamo (*S*), Akooyeelarsemoonroome (*Arab.*), Roghen Bulsan (*Pers.*).

This species of Amyris is a native of Abyssinia, growing, according to Bruce, among the myrrh-trees behind Azab, all along the coast to the Straits of Babelmandel.[2] It appears, however, to have been transplanted into Judea 1730 years before Christ; and as it was from Gilead in Judea that the merchants brought its resinous product, in early times, to Egypt, it thence derived its appellation *Balasan* or *Balsam of Gilead.*

This tree rises above fourteen feet in height; has a flat top and stunted aspect, with many spreading crooked branches going off nearly at right angles: the wood is light, open, and covered with a smooth bluish-white bark. The leaves are thinly scattered, small, composed of one or two pair of opposite leaflets, with an odd one: these are obovate, entire, veined, and of a bright green colour. The flowers are white, appearing upon the young shoots, three upon one stalk; but two generally drop, and one only produces fruit. The calyx is permanent, divided into four expanded sharp teeth: the petals are four, oblong, concave, spreading; the filaments

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[1] Βαλσάμου δένδρον Theophrasti et Dioscoridis.

[2] *Bruce's Abyss.* App. p. 16. The whole of Mr. Bruce's account of this tree is highly interesting, and we regard his authority as undoubted.

eight, erect, supporting oblong anthers; the germen is superior, ovate, with a thick style, the length of the filaments crowned with a quadrangular stigma. The fruit opens with four valves, and contains a smooth nut.

The ancients held the balsam obtained from this tree in great esteem, but it does not appear that they were well acquainted with the tree itself. To obtain the balsam, the bark is "cut by an axe, when the juice is in its strongest circulation, in July, August, and the beginning of September. It is then received into a small earthen bottle, and every day's produce gathered and poured into a larger, which is kept closely corked." The first that flows, called opobalsamum[1], "is of a light yellow colour, apparently turbid." It afterwards becomes clear, fixed, and heavier; and the colour, by degrees, deepens to a golden yellow. The opobalsamum of the ancients was the green liquor found in the kernel of the fruit; the carpobalsamum, the next in esteem, was made by the expression of the ripe fruit; and xylobalsamum, or the worst kind, by the expression or decoction of the small twigs. The real balsam rarely finds its way into this country, dried Canada balsam being generally substituted for it; but it wants the peculiar odour of the true balsam.

Qualities.—The odour is at first strongly pungent; but the pungency is lost by exposure to the air, and by age; and the balsam gradually acquires the consistence of turpentine. The colour is yellowish exteriorly, and paler in the inside; the taste is acrid, rough, and pungent. When pure, it dissolves easily in water.

Medical properties and uses.—This balsam was esteemed in the earlier ages as a medicine possessed of almost universal virtues; and at the present day the Arabs use it "in all complaints of the stomach and bowels," reckoning it a powerful antiseptic, and preventive of the plague. Its chief use, however, is as a cosmetic by the Turkish ladies. It is never brought genuine to this country: and we know not why the Edinburgh College retain it in the list of Materia Medica.

ANCHUSA.[2] *Spec. Plant. Willd.* i. 756.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Boraginaceæ.

G. 277. *Corolla* funnel-shaped: the throat closed with arches. *Seed* engraved at the base.

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[1] Willdenow has a distinct species under the name Amyris *opobalsamum;* but, in a note, says,—"Sunt forte non distinctæ species, sed varietates ab ætate vel solo ortæ." *Spec. Plant.* vol. ii. p. 334.

[2] Ἄγχουσα, ab ἄγχω, *strangulo, suffoco;* the ancients believing that this species of plants choked and destroyed serpents. Vide *Bod. in Theophrast.* p. 835.

Species 7. Anchusa *tinctoria.* Dyer's Alcanet. *Lobel, Icon.* 578.
Officinal. ——, RADIX, *Edin.* Alkanet root.
Syn. Orcanette (*F.*), Alcanna (*I.*).

This species of anchusa is perennial, a native of the south of Europe, where it is cultivated in great abundance, particularly near Montpellier. It is found in our gardens as an ornamental plant; but its roots do not acquire in Britain the beautiful colour for which the foreign are prized. It flowers from June until October. The root is long, round, fibrous, white within, and covered with a purplish red bark. The stem rises eighteen inches in height; is round, rough, hairy, and branched; with long, alternate, sessile, lanceolate, obtuse, hairy leaves. The flowers are of a reddish purple colour, and terminate the branches in close clusters. The calyx is persistent, divided into five oblong erect segments; the corolla funnel-shaped, consisting of a cylindrical tube the length of the calyx, and a five-tooth expansion, closed by five scaly leaflets. The filaments are shorter than the corolla, bearing simple anthers; the germens four, with filiform styles the length of the filaments, each crowned with an obtuse notched stigma.

Alkanet root is brought to this country chiefly from France. It is in twisted pieces, with a withered, dusky red bark, easily separated. The smaller roots are the best, as they have proportionally more bark than the larger.

Qualities.—It has a very faint odour, and a bitterish astringent taste when fresh; but the dry root is inodorous and insipid. It imparts a fine deep-red colour to alcohol, ethers, oils, fats, and wax; but to water, even when hot, it yields only a brown colour. Sulphate of iron strikes a black with the watery infusion; and sulphate of zinc throws down a copious, dark-coloured precipitate.

Medical properties and uses.—Alkanet root was formerly prescribed as an astringent in several diseases; but it is properly rejected from modern practice, and is used as a colouring matter only for oils, ointments, and plasters.

ANETHUM.[1] *Spec. Plant. Willd.* i. 1469.
Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.
G. 560. *Fruit* nearly ovate, compressed, striated. *Pet.* involuted entire.
Species 1. A. *graveolens.* Common Dill. *Med. Bot. 2d edit.* 125. *t.* 48.

1. ANETHUM GRAVEOLENS.

Officinal. ANETHUM, *Lond.* ANETHI SEMINA, *Edin.* Dill seed.

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[1] Ἄνηθον Dioscoridis.

Syn. Fenouil puant, ou persil odorant (*F.*), Dill (*G.*), Dille (*Belg.*), Dil (*Dan.*), Dill (*Swed.*), Kopr (*Polish*), Endro (*Portug.*), Eneldo de olor pesado (*S.*), Appio palustre, sellano, Sellero (*I.*), Sadācoopei (*Tam.*), Sowa (*Hind.*), Moongsi (*Javanese*), Buzralshibbet (*Arab.*).

This plant is an annual, a native of Spain and Portugal, growing generally in corn fields, and flowering in June and July. It is cultivated in this country.[1] The root is fusiform and long, striking deep into the ground; and sending up several erect, striated, jointed stems, about two feet in height, and branched. The leaves are glaucous and odorous, upon sheathing foot-stalks; doubly pinnated, with the pinnæ linear and pointed. The flowers are in large, flat, terminal umbels, without either universal or partial involucrum; the corolla consists of five ovate, obtuse, concave, yellow petals, with the apexes inflected, the filaments yellow, and longer than the corolla; with an inferior germen, covered by the nectary, and supporting two short styles, terminated by obtuse stigmas.

The seeds of dill, which are the parts of the plant medicinally used, are scarcely the length of a carraway seed, but broader and flatter. They are oval, concave on one side, convex and striated on the other; of a brown colour, and surrounded with a dull pale-yellow or straw-coloured membranous expansion. When good, they are heavy, of a bright colour, and an aromatic odour.

Qualities.—The dried seeds have an aromatic, sweetish odour, not very agreeable, nor yet unpleasant; the taste is moderately warm and pungent. These qualities depend on a volatile oil, which is extracted by distillation with water, (according to Mr. Brande, in the proportion of 2 lb. to 1 cwt.[2]) and imparted to alcohol by digestion. The bruised seeds yield their flavour to boiling water by infusion.

Medical properties and uses.—Dill seeds are carminative and stomachic. They are scarcely ever employed except in hiccough and the flatulent colic of infants. The dose of the powdered seed is from grs. x. to ʒj.

Officinal preparations.—*Aqua anethi*, L.

ANGELICA. *Spec. Plant. Willd.* i. 1428.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 343. *Fruit* roundish, angular, solid, with reflected styles. *Corollas* equal. *Petals* bent inward.

Species 1. Angelica *Archangelica*. Garden Angelica. *Med. Bot. 2d edit.* 86. *t.* 35. *Smith, Flor. Brit.* 1. 311.

Officinal. —— RADIX, *Edin.* —— SEMINA, *Dub.* The root and seeds of Angelica.

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[1] It was first cultivated by Gerarde in 1597.

[2] *Manual of Pharmacy.*

Syn. Angelique (*F.*), Angelikawurzel (*G.*), Tamme Engelwortel (*Belg.*), Angelik (*Dan.*), Angelikerot (*Swed.*), Dziegel ogrodni (*Polish*), Djajilnik (*Russian*), Angelica domestica (*I.*), Anjelica (*S.*)

This species of Angelica is a native of the more northern parts of Europe; but although it has been found growing wild in England, as at Broadmoor near Birmingham, and some other parts, yet it is uncertain whether it be indigenous. It is, however, abundantly cultivated for medicinal and other purposes; flowering in June and August.[1] The root is biennial, thick, fleshy, and resinous; the stem erect, hollow, round, smooth, furrowed, of a purplish hue, rising upwards of five feet in height, and sending off many branches, which terminate in globular many-rayed umbels, composed of dense, hemispherical umbellets. The leaves are numerous, petiolated, large, pinnated; with the leaflets ovate, pointed, cleft, and acutely serrated, smooth, somewhat decurrent, and the terminal ones three-lobed: the petioles membranous at the base, nerved, greatly dilated, and bellying. The involucres are deciduous; the involucels short, consisting of five linear lanceolate leaves. The calyx is five-cleft, minute: the corolla small, of a greenish-white colour; petals five, with the points turned inward: the stamens spreading, longer than the petals; and the germen inferior, supporting two reflected styles with obtuse stigmas. The seeds are large, elliptical, flat on one side, convex on the other, emarginate at both ends, and acutely three-ribbed.

The roots of angelica, when wounded in the spring, yield an odorous yellow juice, which being slowly desiccated, proves an elegant gum-resin, very rich in the qualities of the plant. For medicinal purposes, the roots should be dug up in the autumn of the first year; in which case they are more easily preserved; but when gathered in the spring, they become mouldy, and are preyed on by insects. They should be thoroughly dried, and kept in a well-aired, dry place; and in order to secure their preservation, Lewis suggests "the dipping them in boiling spirit, or exposing them to steam, after they are dried." The leaves and seeds do not retain their virtues when kept. The stems are cut, when tender, in May, and made into an agreeable sweetmeat by the confectioners.[2]

Qualities.—The odour of every part of the recent plant is fragrant and aromatic; the taste sweetish at first, then aroma-

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[1] It was first described by Joann. Jacob. *de Manliis,* a writer of the 15th century; and was cultivated in England before 1568.

[2] The Icelanders eat the stems and roots of Angelica raw with butter. Vide *S George Mackenzie's Travels in Iceland,* 4to. p. 255.

tic, warm, and slightly bitter. The dried root is corrugated, and of a greyish-brown colour externally; breaks short with a starchy fracture, and presents a firm interior, whitish, with many resinous brown and yellow points. It has the same odour and taste as the recent plant; and yields these qualities to alcohol, and in some degree to boiling water.

Medical properties and uses.—The leaves and seeds when recent, and the root both in the fresh and dried state, are tonic and carminative; but although the most elegant aromatic of northern growth, yet they are scarcely ever prescribed in modern practice. The dose in substance is from ʒ ss. to ʒj., which may be given three or four times a day.

ANISUM. Vide *Pimpinella Anisum.*

ANTHEMIS. *Spec Plant. Willd.* iii. 2174.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Compositæ.

G. 1517. *Receptacle* chaffy. *Seed down* none, or a membranaceous margin. *Calyx* hemispherical, nearly equal. *Florets* of the ray more than five.

* *With a colourless or white ray.*

Species 15. A. *nobilis.* Common Chamomile. *Med. Bot. 3d edit.* 47. *t.* 19. *Smith, Flor. Brit.* 904.

——— 25. A. *Pyrethrum.* Pellitory of Spain. *Med. Bot.* 3d *edit.* 50. *t.* 20.

1. ANTHEMIS NOBILIS.[1]

Officinal. ANTHEMIDIS FLORES, *Edin.* ANTHEMIS, *Lond.* ANTHEMIS NOBILIS, FLORES, *Dub.* Chamomile Flowers.

Syn. Camomille Romaine (*F.*), Roemische hamiller (*G.*), Romische Kamille (*Dutch*), Romerske Kamulblomster (*Dan.*), Romerske Kamillblommer (*Swed.*), Camomilla Romana (*I.*), Manzanilla de Botera (*S.*), Marcella Romana (*Portug.*), Chāmaindoopo (*Tam.*), Baboeneh (*Pers.*), Ehdaklmerza (*Arab.*).

This species of Anthemis is an indigenous perennial plant, growing in dry pastures, and flowering in August and September. The greater part of the chamomile, however, which is medicinally used, is cultivated by the growers of physical plants.[2] The roots are woody, fibrous, and spreading: the stems trailing, about a span in length, foliaceous and downy: the leaves verticillately bipinnate, the pinnæ distant, and the leaflets small, threadlike, sharp, generally cleft into three segments, and pubescent; odorous, and of a pale green colour. The flowers are on solitary, terminal, unifloral, naked, striated, hairy peduncles. The calyx is common to all the florets, hairy, with broad membranaceous edges; the disc is yellow

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[1] Ἄνθεμις Discoridis. Ἀνθέμην Theophrasti.

[2] Much of what is brought to the London market is grown about Mitcham, in Surrey. The soil best adapted for it is a dry sandy loam. A wet summer weakens the flavour of the flowers.—*Stevenson's Survey of Surrey,* 379.

and convex; the florets of the radius white, spreading, long, and somewhat elliptical, three-toothed, and turned down; and the seed obscurely crowned.

Both the single and the double-flowered varieties are cultivated; but as the sensible qualities of the flower reside chiefly in the disc florets, the single kind should be preferred; and as these qualities are also stronger before the tubular florets are blown, the flowers ought to be then picked, and carefully dried for use. Those which are large are to be preferred; and the cultivated is to be preferred to the wild kind.

Qualities.—The whole of the plant is odorous. The smell of the flowers is strong and fragrant; their taste bitter and aromatic, with a slight degree of warmth; both the odour and the taste are extracted by water and alcohol. By distillation with water they yield a small quantity of a blue, or greenish-blue volatile oil[1], which becomes yellow when kept, and on which the odour and much of the stimulant powers of the plant seem to depend. Hot water takes up nearly one fourth of the weight of the dry flowers, and when the infusion is evaporated, a bitter extractive matter and a small portion of resin remain. The active principles, therefore, of chamomile flowers are supposed to be bitter extractive, resin, and volatile oil: but in treating them in the same manner as black pepper for procuring Piperina, I have obtained a notable quantity of resinoid, to which, chiefly, I ascribe the active antiperiodic properties of chamomile flowers.

Medical properties and uses.—Chamomile flowers are tonic, antispasmodic, and slightly anodyne; yet when a strong infusion of them is taken in a tepid state, it proves powerfully emetic. When given in substance, finely powdered, united with opium and astringents, if the bowels be easily affected, they have been successfully used for the cure of intermittents[2]; and have been quaintly termed "the cinchona of the ancients."[3] Dioscorides recommended the powdered flowers to be administered to ward off the fever; and frictions with the oil were employed for the same purpose by Nechepsam, an Egyptian physician. The infusion in combination with ginger, or other aromatics, and the alkalies, is an excellent stomachic in dyspepsia, chlorosis, gout, flatulent colic, and chronic debility of the intestinal

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1 The quantity obtained is about ℥jss. from 1 cwt. of the flowers. *Brande's Manual.* When the same water was used successively on lb. xij. of the flowers, Hayne procured ℥x. ʒv. 55 gr. of the oil from lb. 108. of flowers.

2 Morton's celebrated powder was composed of one scruple of chamomile flowers, ten grains of salt of wormwood, and ten grains of calx of antimony. It was given every sixth hour.

3 Traité Therapeutique, par. A. Troupeau, vol. i. p. 320.

canal.[1] It is also useful in dysentery, when diarrhœa is not present. The tepid strong infusion is a ready emetic, and is often employed to promote the operation of other emetics. By coction in water the essential oil is dissipated: chamomile flowers, therefore, ought never to be ordered in decoctions. Externally they are used as fomentations in colic, intestinal inflammation, and to phagedenic ulcers; and their infusion is also found to be a useful addition to emollient anodyne glysters in flatulent colic, and in irritations of the rectum producing tenesmus. The dose of the powdered flowers is from gr. x. to ʒj. twice or thrice a day.

Officinal preparations.—*Decoctum Anthemidis nobilis,* E. D. *Decoct. Malvæ comp.* L. *Infusum Anthemidis,* L. *Infusum Chamæmeli,* D. *Extractum Anthemidis,* E. D. *Oleum Anthemidis,* L.

2. ANTHEMIS PYRETHRUM.[2]

Officinal. PYRETHRI RADIX, *Lond. Edin.* ANTHEMIS PYRETHRUM; RADIX, *Dub.* Pellitory root.

Syn. Pyrèthre (*F.*), Bertram Wurtzel; Zahn wurtzel (*G. Dutch, Dan. Swed.*), Zebne Ziele (*Pol.*), Piretro (*Ital.*), Anthemis pelitri (*S.*), Akākrācārum (*Tam.*), Akurkurha (*A.*), Akkaraputta (*Cyng.*).

This is a perennial plant, a native of the Levant, Barbary, and the south of Europe. It is sometimes cultivated in Britain[3]; flowering from June to July. The root is long, tapering, about the thickness of a finger, with a pale brownish-yellow cuticle, sending off several lateral fibres; and throwing up many trailing stems, more commonly simple and unifloral than branching. The leaves are doubly pinnate, with narrow linear segments of a pale green colour. The flowers are large, with the florets of the radius white on the upper, and purple on the under side, and those of the disc yellow. In form they resemble the flowers of Anthemis *nobilis.*

Pellitory root is brought into this country from the Levant, and the coast of Barbary, packed in bales. It is frequently mixed with other roots, from which, however, it is easily distinguished.

Qualities.—The dried root, as we receive it, is inodorous. When chewed it appears at first insipid, but after a few seconds excites a glowing heat, and a pricking or thrilling sensation on the tongue and lips, which remains for ten or twelve minutes. The pieces break with a short resinous fracture; the transverse

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[1] Selle's celebrated Pulvis Ecphracticus consisted of equal parts of chamomile flowers, rhubarb, carbonate of potassa, magnesia, sulphur, and oleo-saccharum of fennel.—*Selli lib. de Cur. Stom. Morb.* vol. i. p. 131. (quoted in Med. Rep. vol. i.)

[2] Πύρεθρον Dioscoridis.

[3] It was cultivated in England by Lobel in 1570.

section presenting a thick brown bark studded with black shining points, and a pale yellow radiated interior. The pungency appears to depend on a fixed oil, which is deposited in vesicles in the bark. M. Gautier describes it as solid, having a reddish colour and strong odour.[1] It is completely extracted by alcohol and sulphuric ether.

Medical properties and uses.—Pellitory root possesses powerful stimulant properties. Its chief use is as a sialagogue, to stimulate the excretories of the salivary glands, and excite an increased flow of saliva; by which inflammations and congestions of the neighbouring parts are relieved. Hence it has been found useful when chewed in some kinds of headach, apoplexy, chronic ophthalmia, rheumatic affections of the face, and toothach; and by its direct stimulus in paralysis of the tongue and muscles of the throat.

ANTIMO'NIUM. Στίμμι. *Stibium.* Antimony.

Syn. Antimoine (*F.*), Spiessglanzmetall (*G.*), Antimonio (*I.*), Antimónio (*S.*).

The term antimony was formerly given to an ore, in which antimony was combined with sulphur; but it is now solely appropriated to express the pure metal.[2] It is found in various parts of the world in different states of combination.

A. Metallic (at Stalberg, Sweden, and Allemont in France).

g. i. combined with silver and iron.	Sp. 1.	*Native Antimony.*
ii. ——— with sulphur.	- 1.	*Grey sulphuret of antimony.*
		Var. *a.* compact.
		b. foliated.
		c. striated.
		d. plumose.
	2.	*Nickeliferous sulphuret.*
B. Oxidized	1.	*White Antimony.*
iii. combined with oxide of iron	- 2.	*Antimonial Ochre.*
	3.	*Red Antimony.*

The sulphuret is the ore from which it is most abundantly procured. Pure antimony is of a white colour, with a bluish-grey shade, brilliant, and very slowly tarnished in air of a low temperature. The texture is foliated, moderately hard, brittle and pulverulent. It is fusible at 810° Fahr., and on cooling acquires a lamellated texture: in a very high temperature it volatilises in close vessels; but if exposed to the air it is very rapidly oxidized, burning and forming, when

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[1] *A. de Chim. et Phys.* viii. p. 101.

[2] Metallic Antimony was first made known by Basil Valentine in the fifteenth century: the name is quaintly supposed to have originated from one of its preparations having proved fatal to some monks; thence *Anti-moine*,

condensed in cool surfaces, white acicular crystals, argentine flowers of antimony, a sesquioxide of the metal. It decomposes water when ignited, and is oxidized by, and combines with, the sulphuric, nitric, and muriatic acids; but the other acids unite with its oxides only. It readily combines with sulphur and phosphorus. Its specific gravity, according to Brisson, is 6·702. The pure metal when rubbed between the fingers communicates to them a peculiar taste and smell, but it exerts no action on the body, nor is it used for officinal purposes. The equivalent of antimony is 64·6.

Officinal. ANTIMONII SESQUISULPHURETUM, *Lond.* SULPHURETUM ANTIMONII, *Edin. Dub.* Sulphuret of Antimony.

Syn. L'Antimoine sulfure (*F.*), Spiessglanz (*G.*), Spiesglas (*Belg.*), Spidseglas (*Dan.*), Rä Spetsglans (*Swed.*), Szpiglas (*Polish*), Unjienakulloo (*Tam.*), Sulfuro d'Antimonio (*I.*), Antimonio (*Portug.*), Kohul (*Arab.*), Surmeh (*H. Pers. Duk.*), Sauvira (*San.*).

Sesquisulphuret of antimony is commonly sold in loaves, under the name of *crude antimony;* and is the *grey ore*, separated from the stony matter and other gross impurities with which it is naturally combined. It is the *striated variety*, the most common of all the antimonial ores, found both in masses and crystallized in Hungary, Saxony, France, Tuscany, Spain, Cornwall in England, and Dumfries-shire in Scotland; generally "in micaceous schistus and clay porphyry, mixed with pyrites and oxides of iron." In its natural state, its colour is light lead grey; its internal lustre splendent; its fracture radiated, affording splintery fragments. It is soft; not very brittle, but easily frangible.

Sulphuret of antimony is fitted for the market by the following process. The ore is separated from the greater part of the stony gangue by hand, and then placed in the bed of a reverberatory furnace, covered with charcoal powder. As it is brought to a low red heat, the sulphuret of antimony is fused, while the earthy parts float on the surface, and are taken off with a rake or ladle; and the fluid portion, when cast into the form of loaves or large cakes, is fit for sale, and forms the *crude antimony* of commerce.[1] Sometimes the ore is broken into small pieces, then washed and put into a pot perforated with holes, which is let into the mouth of another pot, so that the fluid sulphuret flows into the undermost, while the infusible matter remains in the uppermost. These loaves are dark grey externally, but internally they have a striated structure, and considerable brilliancy. Their goodness depends on their compactness and weight, the largeness and distinctness of the striæ, and the volatility of the sulphuret.

1 *Journal des Mines, Aikin's Dictionary of Chymistry.*

When carelessly prepared, they contain lead, sometimes arsenic, and occasionally manganese and iron. When they contain much lead, the structure is more foliated, and less distinctly striated, while at the same time the volatility is so much diminished that a portion, which is the lead, remains fixed. Arsenic is discovered by the garlic odour emitted when the sulphuret is thrown on live coals; manganese and iron, by their not being volatilised when it is exposed to a red heat, and iron in particular by the brown colour produced by deflagrating them with nitre. The specific gravity of the sesquisulphuret is about 4·62; and its constituents are, antimony 73·8, sulphur 26·2, in 100 parts [1]; or, according to the atomic doctrine, 2 atoms of antimony = 125·2, and 3 atoms of sulphur = 48·3, making the equivalent 177·5. The greater part of the sesquisulphuret used in this country is imported from Germany and Holland. It should never be purchased in the form of powder.

Qualities.—Sulphuret of antimony is inodorous, insipid, of a leaden grey or steel colour, staining the fingers; has a rough spicular fracture, and is insoluble in water and alcohol. Its brilliancy is dulled by long exposure to the air; in a red heat it melts, and is partly dissipated along with its sulphur in the form of a white smoke; and what remains in the crucible is a grey ash-coloured oxide. It is slightly acted upon by the vegetable acids [2]; it decomposes the sulphuric and nitric acids when assisted with heat, and is totally dissolved and partially decomposed by the hydrochloric acid; the metallic part of the sulphuret is oxidized, sulphurous acid and nitrous gases are disengaged; the hydrochloric decomposes it, and sulphuretted hydrogen is extricated. The fixed alkalies act upon it, and form kermes mineral, a compound used in medicine.[3]

Medical properties and uses.—Sesquisulphuret of antimony is not an active medicine when taken into the stomach, unless it meets with acid in that viscus or in the bowels, when it operates with extreme violence; before it is prescribed,

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1 Dr. Thomson's proportions are, antimony 100, sulphur 35·572; nearly a mean of all the other analyses that have been published: Vauquelin stated them to be, antimony 100, sulphur 33·333; Wenzel, antimony 100, sulphur 29·870; Proust, antimony 100, sulphur 33·333; Dr. J. Davy, antimony 100, sulphur 34·960; Berzelius, antimony 100, sulphur 37·000; Bergman, antimony 100, sulphur 35·035. *Thomson's Chymistry,* 5th edit. i. 536.

2 Wine was formerly put into cups made of sesquisulphuret of antimony, and, owing to the acid acting upon it, the wine acquired an emetic quality.

3 The sesquisulphuret was used by the Greek ladies, and is still employed by the Turkish ladies, for staining the eyelashes black, which softens the appearance of the eye. It was a custom among the Jews also; for although in our translation of the Bible, Jezebel is described as having "painted her face," (2 *Kings,* ix. 30.) yet the expression in the Hebrew means, literally, "put her eyes in painting."

therefore, the bowels should be opened. It was not employed internally until the middle of the fifteenth century; and now, owing to the uncertainty of its operation, its occasional violent action, and the difficulty of obtaining it perfectly free from other metals, as copper, lead, and arsenic, it is almost entirely discarded from modern practice. It has been given in gouty and rheumatic affections, in scrofula and other glandular obstructions, and in chronic cutaneous eruptions.

It produces perspiration; and in a few instances in which it was given in large doses, Dr. Cullen found that some nausea and even vomiting were excited. It is freely used in veterinary practice, and is given to horses, mixed with their food, to produce a smooth coat. Its chief use is for the preparation of the other antimonial remedies.[1]

The dose of the sulphuret may be from ten grains to one drachm, or more, if the stomach can bear it.

Officinal preparations. The table drawn up by Dr. Black has generally been given as presenting the best view of the officinal preparations of which antimony is the basis; but as many of those mentioned in it have been long since disused, and the nomenclature of all is changed, we have altered it so as to present, on the same plan, a distinct view of the preparations now found in the British Pharmacopœias.

Medicines are prepared from SULPHURET of ANTIMONY;

I. By trituration.

1. *Sulphuretum Antimonii præparatum,* E. D.

II. By the action of heat; (*oxidized.*)

2. *Oxidum Antimonii cum sulphure vitrificatum,* E.
3. *Oxidum Antimonii vitrificatum cum cera,* E.

III. By the action of heat with phosphate of lime (*acidified.*)

4. *Oxidum Antimonii cum phosphate Calcis,* E.
   Pulvis Antimonii compositus, L.
   Pulvis Antimonialis, D.

IV. By the action of alkalies; (*oxidized.*)

5. *Antimonii oxysulphuretum,* L.
   Antimonii Sulphuretum præcipitatum, E.
   Sulphur antimoniatum fuscum, D.

V. By the action of acids; (*oxidized.*)

6. *Antimonii Oxidum nitro-muriaticum,* D.
   Murias Antimonii, E.
7. *Antimonii Potassio-Tartras,* L.
   Tartras Antimonii, olim *Tartarus emeticus,* E.
   Antimonii et Potassæ Tartras, sive *Tartarum emeticum,* D.
8. *Vinum Antimonii Potassio-tartratis,* L.
   Vinum Tartratis Antimonii, E.

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[1] It is an ingredient in *Spilsbury's drops*, which, according to Dr. Paris, consist of *Corrosive Sublimate* ʒ ij., *prepared Sulphuret of Antimony* ʒ j., *Gentian root* and *Orange-peel,* of each, ʒ ij., *Shavings of red Saunders,* ʒ j., made into a tincture, with *a pint of proof Spirit* digested and strained.

All the preparations of antimony contained in this table have one general mode of action, and possess, therefore, the same medicinal properties. Their general operation is evacuant, either by the stomach, the bowels, or the skin; but their determination to these particular parts depends more on the dose, and the constitution and state of the patient, than on the nature of the preparation. In small doses they produce nausea and diaphoresis; in medium doses, vomiting, and purging; in large doses neither, but a simple reduction of excitement.

Antimonials, prior to the time of Basil Valentine, were used only in veterinary medicine; but ever since they were introduced by that learned Benedictine[1] into the Materia Medica, they have been very generally employed for the cure of febrile and inflammatory diseases, when the excitement is great. In the latter stage of fever, however, when much debility prevails, their use is contra-indicated. Some have imagined that the compound powder of antimony of the London College, or its prototype, James's powder, is to be preferred in typhus, and the tartar emetic in synochus; believing that the benefit in the first disease is greater when no sensible evacuation is produced; but as this implies some inexplicable specific action of that preparation, we are not inclined to admit the distinction. The Pulvis Antimonii compositus is an inert preparation. (See Part III.)

ARCTOSTAPHYLOS. *Spec. Plant. Willd.* ii. 616.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Ericaceæ.

G. 871. *Cal.* five-parted. *Corolla* ovate, the mouth pellucid at the base. *Berry* five-celled.

Species 7. A. *Uva Ursi.* Trailing Arbutus, or Bearberry. *Med. Bot. 3d edit.* 287. *t.* 100. *Smith's Flora Britan.* i. 403. *Sprengel Syst. Veget.*

Officinal. UVA URSI, *Lond.* ARBUTI UVÆ URSI FOLIA, *Edin. Dub.* Uva Ursi, Leaves of Bearberry, or Trailing Arbutus.

Syn. Bousserole; Raisin d'ours (*F.*), Baerentraube; Sandberren (*G.*), Beerendruif (*Dutch*), Mulbär-riis (*Dan.*), Mjölonris (*Swed.*), Borowekowe (*Pol.*), Uva Orsina (*I.*), Madronna Uva de Orso; Guaynha (*S.*), Uva de Urso (*Port.*), Kleh (*Chipewyan*), Attoonagaweeat (*Esquimaux*).

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1 BASIL VALENTINE was a Benedictine monk at Erfurd in Germany. He was born in the year 1394, and was the first person who applied chymistry, which prior to his time was considered merely as the art of making gold, to the purposes of medicine. He was the discoverer of the virtues of antimonial preparations as medicines; and has celebrated them in his "*Currus Triumphalis Antimonii,*" a work written in high Dutch, but of which there is an elegant Latin translation by Kirkringius. To Basil Valentine we are also indebted for the discovery of *Ammonia* and of *Ether.* He recommended a *fixed alkali,* made from the shoots of the vine, cut in the beginning of March, for the cure of the gout and gravel. He was the chief of the medical alchymists.

This shrub is a native of the north of Europe, and is found growing wild on the heathy mountains and in the glens of Scotland, flowering in June. It is a low shrub, with the branches nearly trailing; woody, and the bark smooth. The leaves are not unlike those of the myrtle, thick, evergreen, alternate, ovate, longish edges entire, on short petioles; with a network of veins on the under surface, which is pale green, whilst the upper is of a very deep green colour, and glossy. The flowers are in small clusters, each supported on a red pedicel. The calyx is small and obtusely five-toothed; the corolla tubular, oval, flesh-coloured, or whitish, with a red lip, divided at the margin into five minute, obtuse, reflex segments; containing ten short, downy filaments, crowned with erect reddish anthers; and an oval germen, bearing a style longer than the anthers, with a simple stigma. The fruit is a small, round, smooth, glossy, red capsule, with depressed umbilicus, five-celled, of an austere taste, and containing five angular seeds.

The plant should be procured in autumn; and "the *green* leaves alone selected and picked from the twigs, and dried by a moderate exposure to heat."[1] The leaves are sometimes adulterated with those of Vaccinium *Vitis Idæa*, red whortleberry; which, however, are easily detected by wanting the reticulated surface of the Uva Ursi leaves, by their edges being revolute, sparsely and finely serrated, and dotted beneath; and by their infusion not yielding either tannin on the addition of a solution of isinglass, nor displaying the presence of gallic acid on the addition of sulphate of iron.

Qualities.—The fresh leaves are inodorous, and have a slightly bitter, astringent taste, leaving a sweet sensation in the mouth. When properly dried and powdered, they acquire an odour similar to that of Hyson tea; but the taste remains the same, the degree of bitterness only being increased. The colour of the powder is a light brown, with a shade of greenish yellow. Both water and alcohol extract its virtues, and the watery infusion strikes a deep black colour with sulphate of iron. When the powder of the leaves is rubbed with cold distilled water, little more than gallic acid is found in the solution. According to the analysis of Melandri and Moretti, the leaves yield tannin, mucus, bitter extractive, gallic acid, some resin, lime, and oxygenizable extract[2];

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[1] *Cases of Pulmonary Consumption, &c. by Robert Bourne, M.D.,* 8vo. *Lond.* 1806.

[2] *Bulletin de Pharmacie,* 1809, t. i. p. 59.

hence its infusion is incompatible with salts of iron, tartar emetic, nitrate of silver, salts of lead, infusion of yellow cinchona bark.

Medical properties and uses.—Uva Ursi possesses astringent properties[1], on which account it was employed by the ancients in several diseases; but it was not till after the middle of the last century that the attention of modern practitioners was directed to it, as a remedy for calculous complaints and ulcerations of the urinary organs, by De Haen. His observations were confirmed by Cullen: who, however, referred the good effects it produced to its action on the stomach. Dr. Stehberger found that it may be detected in the urine forty-five minutes after it is taken. It has been employed in menorrhagia, cystirrhœa, diabetes, and other fluxes; and Dr. Bourne has lately recommended it in phthisis pulmonalis. He combines it with Cinchona and Opium; but in both these combinations the powers of the substances are greatly diminished by the tannates which are formed; and the cases which he published were scarcely sufficiently decisive to confirm its use in this complaint. The dose of the powdered leaves is from ℈ss. to ʒss., which may be taken two or three times a day.

ARCTIUM.[2] *Spec. Plant. Willd.* iii. 1630.

Cl. 19. *Ord.* 1. Syngenesia Æqualis. *Nat. ord.* Compositæ.

G. 1429. *Receptacle* chaffy. *Calyx* globular; the scales at the apex with inverted hooks. *Seed-down* bristly, chaffy.

Species 1. Arctium *Lappa.*[3] Common Burdock. *Med. Bot. 3d edit.* 32. *t.* 13. *Eng. Bot.* 1228. *Smith's Flora Britan.* ii. 884.

Officinal. ARCTII LAPPÆ SEMINA ET RADIX, *Edin.* ARCTIUM LAPPA, SEMINA, RADIX, *Dub.* The root and seeds of Burdock.

Syn. Bardane (*F.*), Bardana (*I.*), Bardána (*S.*).

This is an indigenous biennial plant, common on the sides of roads and in waste places; flowering in July and August. It is so well known as scarcely to require a description. The root is spindle-shaped, simple, externally of a brown colour, and internally white; the stem succulent, rising three or four feet in height, with spreading branches, and very large, undulated, cordate leaves, of a dark green colour above, and whitish underneath, supported on long foot-stalks. The flowers are in terminal panicles: the calyx is common, globular, composed of imbricated scales with hooked extremities, by which they adhere to clothes and the fur of animals: the

1 It is used in Russia for tanning leather.

2 Αρκτιον Dioscoridis.

3 A. *Bardana* is as frequently used as A. *Lappa.*

corolla is compound, with purple uniform florets, tubular, five-cleft, and all fertile. The receptacle is punctured; the seed-downs are rough and prickly, and the seeds quadrangular.

Qualities.—The roots of Burdock are nearly inodorous, the taste sweetish, with a slight degree of bitterness and astringency: they are deep brown externally, and white within. The seeds, which are sometimes used, are aromatic bitterish, and subacrid. According to Guibourt, the roots contain inuline; and the leaves and stalks, nitrate of potassa.

Medical properties and uses.—The seeds and roots of this plant possess some diuretic powers, and are said to determine also to the surface, without exciting nausea, or increasing irritation. They have been employed, and, as far as report can be credited, with advantage, in scurvy, arthritic affections, lues venerea, phthisis, and nephritic complaints. We have had no experience of their efficacy; but we are ready to believe that the remedy is at least a safe one.

ARGENTUM, *Lond. Edin. Dub.* Silver.

Syn. Argent (*F.*), Silber (*G.*), Silwer (*Swed.*), Argento (*I.*), Pláta (*S.*), Villie (*Tam.*), Rupah (*H.*), Fezzeh (*A.*), Nokra (*Pers.*), Perak (*Malay*), Peddie (*Cyng.*), Rajata (*Sans.*), Im-root (*Esquimaux*), N'zurfa (*Timbuctoo*).

Silver exists native, and mineralized, in different parts of the globe: in Great Britain, in combination chiefly with lead; in France, native silver is found in the departments of the Isère and Haut Rhin; in Germany, the most important mines are those of Freyberg, Schneeberg, and the Harz[1]: mines of silver also exist in Norway and in Spain. Silver has likewise been found at Barnaoule in western Siberia, but not in any very great abundance. The most abundant mines are those of Peru and Mexico. It is found,

A. In its metallic state;	
a. pure crystallized.	Sp. 1. *Native silver.*
b. alloyed with gold.	2. *Auriferous silver ore.*
c. ——— with antimony.	3. *Antimonial silver.*
d. ——— with iron and arsenic.	4. *Arsenical silver.*
e. ——— with bismuth.	5. *Bismuthic silver.*
B. Sulphurets;	
f. combined with sulphur.	1. *Sulphuret of silver.*
g. combined with lead, antimony, and iron.	2. *White silver ore.*
C. Oxidized;	
h. combined with antimonial sulphuret of silver.	1. *Red silver ore,* Subsp. *a.* dark red. *b.* light red.

[1] These yield annually 1530 marks of silver.

D. Salts;

i. combined with chlorine.	1. *Horn silver, common, and earthy.*
k. ——— with carbonate of antimony.	2. *Carbonate of silver.*

Besides these ores, there are many metallic ores which contain silver in sufficient quantity to render the extraction of it profitable. In its native state, it is in small lumps, or crystallized in cubes, hexahedrons, octahedrons, or dodecahedrons; and occasionally assumes the form of leaves, threads, or twigs.[1] Its colour is white, its lustre metallic, and fracture hackly. Its specific gravity is from 10 to 10·338. It is not perfectly pure, but contains from ·03 to ·05 of gold, or arsenic, or antimony. But silver is obtained in its pure metallic state, generally, either by fusion or by amalgamation. By the first process, the native ore is roasted to expel the sulphuret, antimony, arsenic, or other volatile principles: the residuum is then fused with lead, and exposed in a cupel (a vessel made of bone or of wood ashes) to a strong heat in the hearth of a refining furnace; when the lead and the foreign metals, being thus oxidized, and the oxides fused, are in part absorbed by the porous cupel, and in part volatilized and driven off by the current of air from the bellows or the blast-pipe. An experienced eye knows when the silver is sufficiently pure; but in general it requires a second cupellation at a higher temperature to purify it completely from the lead with which it is combined. By the second process, the ore is first roasted, then ground to a fine powder, washed, mixed with sea salt, and roasted in a reverberatory furnace. The sulphur is changed into sulphuric acid, and sulphate of soda is formed, whilst the chlorine of the sea salt forms with the silver a chloride. The whole roasted mass is next ground to powder, mixed with mercury, iron, and water, and formed into an amalgam with the mercury, by the barrels being made to revolve very rapidly on their axis by means of machinery. The silver is first separated from the chlorine by the iron, and forms an amalgam with the mercury: it is then separated from the mercury by distillation. For pharmaceutical purposes, the best mode of procuring pure silver is the following, pointed out by M. Gay Lussac:—Dissolve the silver to be purified in nitric acid, and dilute the solution with distilled water; then precipitate the silver by means of a clean plate of copper; wash the precipi-

[1] It is found in this form in the famous mine of *Potosi*, and is called *dendrites.*

tate with a solution of nitrate of silver, digest in ammonia, and ultimately wash with boiling distilled water: the pure silver is then obtained in the state of powder. Or decompose the solution of the silver in nitric acid with muriate of soda, wash and dry the precipitate, and then throw the dry chloride in successive portions into a red-hot Hessian crucible containing carbonate of potassa, twice the weight of the chloride. Effervescence takes place, chloride of potassium is formed, carbonic acid and oxygen gas evolved, and pure silver subsides to the bottom of the crucible.

Qualities.—Pure silver is a brilliant-white, insipid, inodorous, sonorous metal, with a very rich lustre, which it loses when long exposed to the air, owing to sulphuretted hydrogen being almost always present in the atmosphere. It is in hardness between iron and gold, of considerable malleability, the finest silver leaf being only one third thicker than gold leaf. It is of inferior ductility to gold, platina, and iron. Its specific gravity, when hammered, is 10·51. Silver is fusible at 187° Fahr. or 28° Wedgewood; it is volatilized by a stronger heat; but difficult of oxidizement by the action of heat and air. It is oxidized by sulphuric and nitric acids, and combines with them; but none of the compounds, except that produced with the nitric acid, are used in medicine. In the solution of the nitrate chloride of sodium throws down a white precipitate, which is soluble in an excess of ammonia;—when the silver is pure, the addition of hydro-sulphuric acid does not colour the supernatant fluid. The equivalent of silver is 108.

Medicalproperties and uses.—Metallic silver has no action on the human body; but when combined with cyanogen or nitric acid, it forms a very powerful remedy. Many of the instruments used by the surgeon require to be made of silver.

Officinal preparation. *Argenti Nitras*, L. E. D. *Argenti Cyanidum*, L.

ARISTOLOCHIA.[1] *Spec. Plant. Willd.* iv. 151.

Cl. 20. *Ord.* 4. Gynandria Hexandria, *Nat. ord.* Aristolochiaceæ.

G. 1609. *Cor.* of one petal, strap-shaped, ventricose at the base. *Cap.* six-celled, inferior, containing many seeds. *Stem* twining, frutescent.

Species 27. A. *Serpentaria.* Virginia Snake-root, or Birthwort. *Med. Bot. 3d edit.* 152. *t.* 59. *Veg. Mat. Med. of the United States*, pl. 25.

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[1] The Αριστολοχια Dioscoridis gives name to the genus, but is not the officinal plant, which was introduced only since the settlement of Europeans in America. The name is derived from some supposed virtue of cleansing the lochia after child-bearing; thence the English name *Birthwort.*

Officinal. SERPENTARIA, *Lond.* SERPENTARIÆ RADIX, *Edin.* ARISTOLOCHIA SERPENTARIA; RADIX, *Dub.* Serpentària Root.

Syn. Serpentaire (*F.*), Virginische Schangenwurzel (*G.*), Slangelwortel (*Dutch*), Slangrod (*Danish*), Ormrot (*Swed.*), Serpentaria de Virginia (*I. S. Por.*).

This plant is a native of North America, from Pennsylvania to Florida; flowering in May and June, and ripening its seeds in September. The root is perennial, consisting of bundles of fibres, of a yellow-ochre colour, which changes to brown on drying, attached to a contorted horizontal caudex; from which several stems rise about 10 inches in height, slender, crooked, and jointed; supporting on long foot-stalks at each knot, thin, cordate, entire, pointed, trinerved leaves, of a yellowish-green colour. The flowers proceed from the joints near the root, and stand upon long sheathed articulated peduncles, which bend down and almost bury the flowers beneath the decayed leaves near the roots.[1] There is no calyx: the corolla is of a brownish purple colour, globular at the base, contracted and bent in the middle, and terminating in a triangular lip. The anthers are sessile, attached to the under-side of the stigma, which is roundish, divided into six parts, and almost sessile, rising from an oblong, angular, hairy, inferior germen. The seeds are flat, and contained in a six-celled hexagonal capsule.

Dried serpentaria root is imported into this country in bales, each containing from two to five hundred weight. It is frequently mixed with the roots of Collinsonia *præcox.*

Qualities.—The dried root has an aromatic odour, not unlike that of valerian; and a sharp, warm, bitter, pungent taste, resembling, in some degree, that of camphor. Water extracts all the sensible qualities of the root, affording a yellowish-brown infusion, which is not altered by sulphate of iron or zinc, nitrate of silver, bichloride of mercury, tartarized antimony, the mineral acids, and the alkalies, nor is it precipitated by gelatine or tannin. The acetate of lead throws down a flocculent precipitate, which is not soluble in acetic acid, showing the presence of mucus. With alcohol, it affords a bright greenish tincture, which is rendered turbid by the addition of water. According to Bucholz, the components of serpentaria are, volatile oil, 5; yellow gum-resin, $28\frac{1}{2}$; extractive, 17; gummy extract, 181; woody fibre, 624; and water, $144\frac{1}{2}$, in 1000 parts. The active principles of serpentaria, therefore, appear to reside in a bitter resin and a volatile oil.

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[1] Some of the species of Aristolochia, in South America, have flowers large enough to serve as bonnets for children.

Medical properties and uses.—Serpentaria root is a stimulating diaphoretic and tonic. It is beneficially employed in typhoid and putrid fevers, whether idiopathic, or accompanying the exanthemata, to excite diaphoresis, and support the powers of the system; and is found frequently to increase the efficacy of Cinchona in removing protracted intermittents. It is also an excellent remedy in dyspepsia, particularly when the skin is dry and parched; and is sometimes used as a gargle in putrid sore throat. On account of its stimulant properties, it is contra-indicated in the inflammatory diathesis; and, previous to its exhibition, the bowels should be well evacuated.

It may be given in substance, or in infusion made by macerating ℥j. of the bruised root in f℥xij. of boiling water, in a covered vessel for two hours, and straining. Decoction is a bad form of preparation of Serpentaria, as the boiling dissipates the volatile oil, on which much of the virtue of the remedy depends. The dose of the powdered root is grs. x. increased to ʒss.; that of the infusion, f℥jss. to f℥ij., given every fourth hour.

Officinal preparations. *Infusum Serpentariæ*, L. *Tinctura Serpentariæ*, L. E. D. *Tinctura Cinchonæ composita*, L. D. *Electuarium opiatum*, E.

ARMORACIÆ RADIX. Vide *Cochlearia Armoracia.*

ARNICA. *Spec. Plant. Willd.* iii. 2106.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Compositæ.

G. 1491. *Recep.* naked. *Seed-down* simple. *Cal.* with equal leaflets. *Corol.* of the ray have more frequently five filaments without anthers.

Species 1. A. *montana.* Mountain Arnica. *Med. Bot. 3d edit.* 41. *t.* 17. *Flor. Dan. t.* 728. *Nuttal. Gen. Aus.* ii. p. 164.

Officinal. ARNICÆ MONTANÆ FLORES ET RADIX, *Edin.* ARNICA MONTANA; FLORES, FOLIA, RADIX, *Dub.* The flowers and root of Arnica.

Syn. Arnique (*F.*), Arnika, Woheverleih, Falkraut (*G.*), Valkruid (*Belg.*), Wolverley (*Dan.*), Häst sibler, St. Hansblomster (*Swed.*), Arnica (*I.*).

This species of Arnica is a native of the northern parts of the continents of Europe and America, and of Siberia; flowering in July. It is also found in Portugal and on the Pyrenees, and is cultivated in our gardens.[1] The root is perennial, brown, woody, præmorse, with bundles of long fibres attached to it: the stem, which rises about a foot in height, is obscurely angular, striated, rough, hairy, and terminated by two or three upright peduncles, each bearing one flower. The radical

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[1] It was introduced by Mr. P. Miller in 1759.

leaves are ovate, entire, ciliated, and more obtuse than those of the stem, which are in opposite pairs, and lance-shaped. The flowers are of a deep copper-yellow colour, tinged with brown; the calyx is a dirty green, composed of fifteen or sixteen lancet-shaped hairy scales, with purple points; the ray consists of about fourteen ligulate flowers, twice as long as the calyx, striated, three-toothed, and hairy at the base; the disc of tubular florets, with a five-lobed margin. The seeds are oblong, striated, hairy, and crowned with a russet-coloured down.

The herbaceous part of the dried herb, which is used equally with the flowers and roots, seems as if covered with a hoary powder.

Qualities.—The dried plant has a pleasant, weak, aromatic odour, and excites sneezing. The taste of the *leaves* and the *flowers* is slightly aromatic, bitter, and pungent; that of the root, bitter and acrid. The leaves and the flowers, macerated in boiling water, yield an olive-brown infusion, which has an odour not unlike that of senna, and a bitter, hot taste. It reddens tincture of litmus; but does not precipitate glue, nor alter solutions of tartarized antimony and of oxymuriate of mercury. With sulphate of iron and of zinc, it strikes a deep green colour, and gives dark precipitates; and with sulphate and ammoniated sulphate of copper, a pea-green precipitate. Superacetate of lead coagulates it. The mineral acids render it muddy, and of a dirty white colour, occasioning brown precipitates; but the alkalies only deepen its proper colour. Both alcohol and sulphuric ether take up from the flowers and leaves a resinous matter, which can be separated from the alcohol by water, and from the ether by evaporation. Hence we may conclude, that Arnica contains an acid[1], (which I have found to be the Igasauric; and from its physiological effects, I am disposed to think it also contains either strychnia or brucia,) resin, a nauseous bitter matter, which, according to MM. Lassaigne and Chevallier, is *cytisina*[2], tannin, and mucus; and that sulphates of copper, iron, and of zinc, superacetate of lead, and the mineral acids, are incompatible in prescriptions with infusions of its leaves and flowers.

Medical properties and uses.—The *leaves* and *flowers* of Arnica are narcotic, stimulant, and diaphoretic; and in large doses, emetic and cathartic; the *root* is tonic and aromatic;

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[1] Bouillon la Grange thinks it is the gallic acid.

[2] This principle derives its name from having been first found in the seeds of the Cytisus *Laburnum*.

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but it is more apt to excite vomiting than the flowers. The *leaves* are also employed. The flowers have been used with advantage in paralytic affections, amaurosis, gout, rheumatism, and chlorosis. They have been extolled also in convulsive diseases, diarrhœa, and dysentery; but in the latter, their stimulant properties prove often hurtful. In paralysis, their good effects are generally preceded by a pricking sensation in the affected part; but in general they do not produce any sensible operation, unless when exhibited in too large doses: in which case they produce great anxiety, pain, vomiting, tetanic twitchings, and the other deleterious effects of powerful narcotics. The *root* has been much extolled in Germany, as a succedaneum for Cinchona in intermittents, putrid fevers, and gangrene; particularly by Dr. Collin of Pazman; but in the hands of British practitioners it has not deserved the high encomiums which he has bestowed on it in these cases. It is regarded by the French practitioners as an excellent tonic in paralysis.[1]

Externally the powdered leaves may be used as an errhine.[2]

Arnica may be exhibited in substance; or in an infusion, made by macerating ʒjss. of the leaves and flowers, or ℈ij. of the bruised root, in f ℥xij. of boiling water, and straining through linen. The infusion soon ferments. A dose of the powder is from grs. v. to grs. x.; that of the infusion, f℥jss, twice or thrice a day.

ARSENICUM[3], Arsenic.

Syn. Arsenic (*F.*), Arsenick (*G.*), Arsénico (*S.*).

This metal is found in most parts of the world, accompanying other metals, and occasionally uncombined, forming distinct and peculiar veins. The following are the states in which arsenic is found: —

A. In its metallic state:
  i. Alloyed with iron, or silver, or gold. *Sp.* 1. *Native arsenic.*

B. United with sulphur and iron:
  ii. Sulphurets. 2. *Arsenical pyrites.*
  3. *Orpiment.* Var. *a.* Realgar.
  b. Yellow orpiment.

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[1] Vide *Nouv. Elémens de Thérapeutique,* par I. L. Alibert, 2d edit. vol. i. p. 141.

[2] The Savoyards, and the inhabitants of the Vosges, both snuff and smoke the leaves; and thence the plant is known on the Continent by the name of *Tabac des Savoyards et des Vosges.* With the exception of the goat, no animal will eat the plant.

[3] From αρσενικον Dioscoridis, which, however, is not the metal, but realgar, one of the species of the sulphuret; σανδαραχη of the other Greeks.

C. United with oxygen:

iii. oxide.	4. *Native oxide.*

D. Acidified; and

iv. Combined with lime.	5. *Arseniate of lime. Pharmacolite.*
v. ——————— copper.	6. ——————— *copper.* Var. *a.* Foliated. *b.* Lenticular. *c.* Oliven ore.
vi. ——————— iron.	7. ——————— *iron. Cube ore.*
vii. ——————— lead.	8. ——————— *lead.*
viii. ——————— cobalt.	9. ——————— *cobalt. Red cobalt ore.* Var. *a.* Cobalt crust. *b.* ——— bloom.

As metallic arsenic is not used in the arts, it is seldom extracted from its ores, but is prepared for the purposes of experiment or of curiosity from white arsenic, or arsenious acid, which is commonly procured in roasting the arseniate of cobalt. It is necessary, however, to be acquainted with the appearances and properties of metallic arsenic; as the reduction of the acid is one mode of ascertaining whether the arsenious acid has been used as a poison, in cases of suspicious death.

Its colour is bluish grey, something like that of steel, with much brilliancy. It is quickly tarnished by exposure to the air, becomes black, and falls into powder. It is extremely brittle, and pulverulent. Its specific gravity is 5·8843.[1] It volatilizes at a heat of 356° Fahrenheit, in dense white fumes, which have the odour of garlic, although the solid metal is inodorous. In its metallic state, Arsenic exerts no action on the animal system; but when oxidized, it is a virulent poison. The equivalent of Arsenic is 37·7.

Officinal. ACIDUM ARSENIOSUM, *Lond.* OXIDUM ARSENICI, *Edin.* ARSENICI (OXYDUM ALBUM), *Dub.* White Arsenic.

Syn. Arsenic oxyde natif (*F.*), Naturlicoer Arsenickhalk (*G.*), Arsenik (*Dan. Swed. Polish*), Muschjak (*Russian*), Arsenico iixneo (*I.*), Arsenico Turabulhalik (*Arab.*), Samuel-k'har (*H.*), Sanc'hya (*San.*), Vallay Paskanum (*Tam.*), Sumulfar (*Pers.*), Wrangon (*Malay*).

Arsenious acid is found native and uncombined at Andreasburg in the Harz, and elsewhere: but the greater part of the white Arsenic (Arsenious acid) of commerce is obtained in Bohemia and Saxony, in roasting the Arseniurets of Cobalt for making zaffre; at Altenburg in Silesia it is procured from arsenical pyrites; and at Riechenstein from the sesquiarseniate

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[1] Turner.

of iron. The roasting is performed in furnaces with long flues, in which the impure oxide is condensed, and this is purified by sublimation in the following method:— Large square boxes of cast-iron, furnished with conical heads, which are closely luted to them with clay, are disposed in a brick area, heated by the flues of two furnaces placed a little beneath them. When these boxes are red-hot, the impure arsenic, by fifteen pounds at a time, is put into them, where it melts and soon sublimes in the conical head. Successive additions are thus submitted to the action of heat, till about 150 pounds have been used to each vessel; and then the apparatus is allowed to cool. The conical head is now separated from the box, and carried with its contents into another place, where the workmen break off with hammers the sublimed oxide, separating the impurities for a second operation.[1]

The *arsenious acid* thus obtained is a dense, semi-transparent, or vitreous solid cake, breaking with a conchoidal fracture; and becoming opaque, of a snowy whiteness, and often pulverulent, when exposed to the air. It is met with in both these forms in the shops; and often is sold in powder, in which state it is sometimes adulterated with white sand, chalk, and gypsum; but the fraud is easily detected by heating a small portion of the suspected powder, by which the oxide is entirely dissipated, and the impurities are left behind.

A great quantity of the arsenious acid used in this country is brought from Germany, in casks, each containing from two to five hundred weight: much, however, is prepared in Cornwall[2] from the arsenical ores of copper, in the roasting of which it is formed, and sublimes in a pulverulent form in chambers attached to the furnaces; after which it is refined in cast-iron pots with cylindrical heads, contracted into cones terminating in pipes. It sublimes, and is condensed in cakes in these heads.

Qualities.—Arsenious acid is inodorous; has very little taste, leaving on the tongue a sweetish impression; it is highly corrosive. When pure, if it have not been freely exposed to the action of the air, it is in semi-transparent, vitreous, colourless, shining masses, which break with a conchoidal fracture. Guibourt has lately ascertained that 1000 parts of water at 60° dissolve, during 36 hours, 9·6 of the glassy acid (sp. gr. 3·7391), and 12·5 of the opaque (sp. gr. 3·695): that the

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[1] *Journal de Physique,* tom. i. p. 44.

[2] There are only two works in Cornwall; one at the Cavan stream-works, the other at Perran near Truro.

same quantity of boiling water dissolves 97 of the glassy, retaining 18 when cold; and 115 of the opaque, retaining 29 when cold. According to Dr. Christison, tea, milk, and similar organic substances impair its solubility.[1] Both solutions usually slightly redden infusion of litmus, and combine with the alkalies. It is soluble also in solution of pure potassa, in alcohol, and in oils. When heated in the open air, this acid is volatilized in a temperature of about 380° Fahr.: the vapour has no odour; but if it be heated in contact with any substance which has an affinity for oxygen sufficient to decompose it, the vapours have an alliaceous odour.[2] The specific gravity of the acid in its ordinary state is 3·706, that of the glassy variety 3·699. According to the average of the experiments by different chymists, 100 parts of the oxide consist of 74·6 of arsenic, and 25·4 of oxygen [3], or of 1 equiv. of arsenic $= 37·7 + 1\frac{1}{2}$ of oxygen $= 12$; thence the equivalent of the acid is 49·7, or, according to Berzelius, of 2 As + 3 O = 99·4 ($\dddot{\underline{As}}$). On the simple watery solution of the acid, no change is produced by a solution of sulphate of iron, of bichloride of mercury, tartar emetic, the mineral acids, or the alkalies; but ammoniacal nitrate of silver throws down a yellowish precipitate, which gradually passes to a brown colour; ammoniated sulphate of copper a pea-green precipitate; and acetate of lead a white precipitate. Lime water also precipitates it white; sulphurets of the alkalies, pale yellow; and sulphuretted hydrogen gas, and an aqueous solution of that gas, golden yellow.

Medical properties and uses.—Although arsenious acid is the most virulent of the mineral poisons, yet, when properly administered, it is a medicine of great efficacy; and is employed internally as a tonic, and externally as an escharotic. It had been long used as an external empirical remedy in cancer, and internally in some cutaneous affections, both in Europe and the East Indies. It was first employed as a remedy for the cure of intermittents in Hungary; and has been long used in Lincolnshire under the name of "the ague drop;" but its effects were not clearly understood, nor the proper mode of administering it known, till Dr. Fowler of Stafford

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[1] *Christison on Poisons*, p. 77.

[2] The smelters of copper in Cornwall and Wales, although much exposed to the vapours of arsenic, yet suffer very little from them; but they are sometimes attacked with cancer in the scrotum. Dr. Paris (*Pharmacologia*) remarks, that they rely upon oil being an antidote; and are consequently supplied with it by their employers.

Proust, Davy, and Dr. Thomson's proportions are, arsenic 100 + 34·309 oxygen. *Annals of Phil.* iv. p. 176.

published his Observations on its use in the cure of intermittent fevers and periodical headachs.[1] Since that time the authority of many respectable practitioners has been brought forward in confirmation of its efficacy in these diseases. My own experience has amply confirmed its value in lepra, chronic rheumatism, intermittent hemicrania or *megrim*, scirrhus; and it is stated also to have proved useful in some local painful affections "of the ends of the bones, cartilages, or ligaments, or of all three together." It has also been used in chorea, dropsy, hydrophobia, syphilis, visceral and glandular obstructions, and in many other diseases, in which, however, its efficacy is by no means established.[2] In the East Indies the native physicians employ white arsenic (*sanc'hya*) made into pills with six parts of black pepper, for the cure of confirmed lues (*Persian fire*), and of a species of elephantiasis (*Judham*).[3] It is also used in cases of the bite of the hooded snake, *cobra del capello.*

The internal use of arsenious acid is contra-indicated in all cases attended with strong arterial action, and where there are any pulmonary symptoms; and should a cough even intervene during its use, it should be instantly discontinued. When it is exhibited in proper cases, and with necessary precaution, the effects it produces must be carefully observed: "the feeling of swelling and stiffness of the palpebræ and face, heat, soreness and itching of the tarsi, or tenderness of the mouth[4]," loss of appetite, thirst, want of sleep, tremors, hot skin, and quick pulse, are indications that the dose of the remedy has been carried to its full extent, and should then be diminished. If erythema or salivation appear, the use of it must be suspended; and it should be altogether abandoned, if pain of the stomach, or nausea, vomiting, headach, or vertigo be induced.

This acid is exhibited either in substance or in solution. The best mode of giving it in substance is in the form of pills, formed by rubbing one grain of the acid with a few grains of sulphur, and then beating the mixture with a sufficient quantity of crumb of bread, so as to form ten moderately-

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[1] It is a curious fact, that previous to the introduction of copper-works in Cornwall agues were very frequent; but since that period the disease is extremely rare. "I have heard it," says Dr. Paris (*Pharmacologia*), "remarked by the men in the works, that the smoke kills all fevers." Is this owing to the arsenical fumes?

[2] For a list of these diseases, see a paper by Mr. Hill of Chester. *Edinburgh Med. Journal*, v. 19. 312 and vi. 55.

[3] Asiatic Researches, 8vo. 5th edit. vol. ii. p. 158.

[4] Dr. Kellie, *Edin. Med. Journ.*

sized pills; one of which is a dose. The solution, however, is more manageable. The most common form of it is that of the London College (vide *Liquor arsenicalis*); but the simple solution in distilled water, in the proportion of four grains to a pint, is also given according to M. Le Febvre's method. A table-spoonful of the solution, mixed with a little syrup of poppies and half a pint of milk, is directed to be taken in the morning fasting, and the frequency of the dose increased until six spoonsful be daily taken.

As an external application, the arsenious acid has been long employed in cases of cancer; and has certainly done more to improve the ulceration, and give it a disposition to contract and heal, than any other external application. It has been sprinkled, in the form of powder, upon the sores; but the most violent pain follows this mode of applying it; and in some instances, probably from its absorption, the general system has been dangerously affected. The more usual mode of using it is in the form of a lotion, composed of eight grains of the acid, and the same quantity of subcarbonate of potassa, dissolved in four fluid ounces of water; or as an ointment, formed by rubbing together one drachm of the acid and twelve drachms of spermaceti ointment. These applications produce little pain and irritation, cause the diseased parts to slough off, and amend the fetid discharge; but although to a certain extent they produce the most beneficial effects, yet the instances in which a cure has been effected are very rare; and they sometimes convey into the habit enough of the acid to produce much mischief.

Arsenious acid is not unfrequently the cause of death, from accidents occurring to those artists who use it in their manipulations; as glass-makers, dyers, and workers in gold; or from ignorance of the proper dose of its preparations when medicinally used; or from the employment of it as a poison. The symptoms which occur are either those of inflammation of the stomach, incessant vomiting, purging, a sensation of heat, and pain of the stomach[1]; constriction of the throat, an increased flow of saliva, and great heat of the mouth; rapid sinking of the pulse, which is at first full, hard, and frequent, cold sweats, convulsions, and death; or if the quantity be not sufficient to produce speedy dissolution, the principal operation of the poison is on the vascular and nervous systems. The

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[1] In a case detailed by Dr. Yelloly, no pain of the stomach, convulsions, nor delirium occurred, although it terminated fatally. *Edin. Med. and Surg. Journ.* v. 389.

first-mentioned symptoms are often absent, or are succeeded by paralysis, hectic, syncope, and other symptoms of extreme debility.[1] When death takes place, symptoms of putridity are said soon to present themselves; but this is not always the case, although the body is often marked with livid stripes, and covered with ecchymoses; and on dissection, the stomach often, although not always, is found to be either abraded, or completely eroded in several parts; with appearances of inflammation extending through the whole abdominal viscera; often extravasation of blood into the cellular tissue of the canal, ulceration, softening of the mucous tunic, and occasionally gangrene. The heart is flabby, red in the substance, and the pericardium contains serum. In the thorax the pleura is red, and its sac often containing serum; the lungs are congested, and the lining membrane of the air tubes is inflamed. In the cranium the brain is found congested: but when death is less the consequence of inflammation than of a peculiar and immediate influence of the poison upon the nervous system, no morbid change is discoverable on dissection. Particles of the acid are occasionally found adhering to the abraded parts of the villous coat of the stomach.

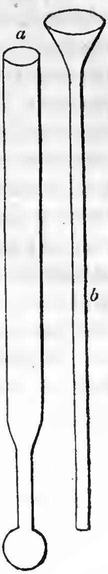
Various methods of counteracting the poison of the arsenious acid have been recommended. Whatever antidote is adopted, the stomach should, in all cases, be immediately evacuated; and the best mode of doing this is by means of the stomach pump, administering large draughts of tepid mucilaginous fluids. In order to render the arsenic inert, solutions of the alkaline sulphurets and vinegar have been advised: but the experiments of Renault have demonstrated how little reliance is to be placed on these articles. Hahneman orders one pound of soap to be dissolved in four pounds of water, and a cupful taken, tepid, every three or four minutes; and as this is the antidote most readily procured, if lime-water or chalk and water cannot be at hand, it should always be the first employed. Lime-water proves useful by coating the particles of the white arsenic with an arsenite of lime, which is nearly insoluble, and consequently almost inert.[2] Dr. Yelloly, reasoning on the probability that the inflammation induced is often the cause of death, even after the stomach is freed from the whole of the poison, suggests the propriety of early blood-letting in these cases.[3] Opium, camphor, and ether may be

1 On this subject our readers will find much practical information in the *London Medical Repository*, vol. v. p. 97., and still more in Dr. Christison's excellent work *on Poisons*, p. 177.

2 See our experiments on this subject, in the *London Med. Repos.*, vol. viii. 157.

3 *Edinburgh Med. and Surg. Journal*, v. 392.

employed to quiet the nervous irritability, and ammonia to stimulate the heart.



As medical men are often called upon in courts of law to establish the fact of white arsenic having been used as a poison, it is necessary to know the best tests by which it may be recognised. If on searching in the stomach, or among its vomited contents, any considerable quantity of the suspected poison be discovered, a little of it must be mixed with three times its weight of black flux, composed of one part of finely-powdered charcoal, and two parts of dry carbonate of potassa; or, to a grain of the poison add half a grain of charcoal, and a grain of dried carbonate of potassa. These must be put into a thin glass tube, about four inches in length and 1-4th inch in diameter, hermetically closed at one end. (*fig. a.*) The open extremity must then be slightly plugged with a piece of paper, taking care to preserve clean the upper portion of the tube, by introducing the powder by means of a small funnel (*fig. b.*) or a cylinder of clean white paper. The tube, being thus charged, should be kept for a quarter of an hour in the flame of a spirit lamp, heating it first above the bulb, and then holding the bulb steadily in the flame of the lamp: when, if the powder introduced into the tube contain arsenious acid, metallic arsenic will sublime and be found lining the inside of the tube with a brilliant metallic crust. The upper part of the material should always be heated first with a small flame; then, the wick of the lamp being drawn up, the heat should be applied to the bottom of the tube. That the sublimated matter is arsenic may be further proved by volatilizing a small portion of the reduced metal on a red-hot iron, and observing whether it present the garlic odour peculiar to the vapour of metallic arsenic: or if the crust be small, by cutting off the bulb of the tube, and heating the part containing the crust, so as to oxidize it; and then testing the acid by the under-mentioned tests.

When the poison is found in a larger quantity, it should be further tested by dissolving a small portion of it in two drachms of boiling rain or distilled water, with three grains of subcarbonate of potassa, or, what is to be preferred, the subcarbonate of ammonia, then adding to this a warm solution of five grains of sulphate of copper, which will produce a lively grass-green precipitate if arsenic be present; and if the precipitate be heated in a test-tube with a little wax, it will sublime in the form of metallic arsenic. A solution of some of the suspected poison may be made, without the addition of an alkali, and tested with the ammoniacal sulphate of copper [1], which immediately throws down a beautiful apple-green precipitate; or with the ammoniacal nitrate of silver [2], which throws down a sulphur yellow arsenite of silver. When no powder is discovered in the stomach, its contents and the vomited matter may be boiled with distilled water, with the addition of some pure potassa, and filtered; and then a warm solution of the sulphate of copper, as above described, added to it. Mr. Phillips, however, has shown that if the sulphate contain any peroxide of iron, it will afford a green precipitate, although no arsenic be present. To prevent this fallacy, he directs the potassa to be added to the sulphate of copper first, and to a part of this the suspected solution, when the blue precipitate will become green, if arsenious acid be present. The test with nitrate of silver was first proposed by Mr. Hume[3]: one part of the suspected poison, and three parts of subcarbonate of potassa are to be dissolved in a sufficient quantity of rain or distilled water at 212°; and the surface of this solution slightly touched with a stick of nitrate of silver. If arsenious acid be present, a sulphur-yellow coloured precipitate will be seen falling rapidly from the point where the nitrate is applied. In our experiments we have found that the sixtieth part of a grain of the acid is clearly discovered in two ounces of water by this test. This precipitate, which is arsenite of silver, should afford, when heated with wax, indications of metallic arsenic, as in the former case. All these experiments should be performed in the day-time, and the precipitated fluid examined by reflected, not transmitted, light.[4] Objections have been raised against the nitrate and ammoniated nitrate of silver, because the presence of the alkaline phosphates in the suspected fluid would produce precipitates of a similar colour with nitrate of silver; and if muriate of soda, or of any other alkali, were present, the test could not be employed, on account of the copious precipitates of chloride of silver which these produce with the nitrate. The first objection is obviated by making the trial on paper,

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[1] The ammoniacal sulphate of copper is prepared by precipitating a strong solution of sulphate of copper, by means of ammonia, then partly redissolving the precipitate by an excess of ammonia.

[2] Prepared in the same manner as the above, substituting nitrate of silver for sulphate of copper: it should not cause a precipitate with solution of phosphate of soda.

[3] *Philosophical Mag.*, May 1809.

[4] Bostock, *Edin. Med. and Surg. Journ.*, v. 170.

as recommended by Dr. Paris: drop a little of the suspected fluid on writing-paper, and draw several times over it a stick of lunar caustic; which, if arsenious acid be present, will leave a streak of colour, that becomes a very bright queen's yellow, if brushed with some liquid ammonia; but if no arsenious acid be present, and only alkaline phosphates, the streak will be uniform, and in a few minutes will fade into a sad green, and gradually become black. Dr. Marcet has shown us how to obviate the difficulty with regard to the muriates, by adding to the suspected fluid dilute nitric acid, and then applying the nitrate of silver to its surface until no more precipitation is produced; by which means the whole of the muriatic acid is removed: and as the arsenite of silver remains in solution, it is rendered evident by a yellow precipitate being instantly formed on the addition of ammonia. A still better method is to precipitate all the muriates by nitrate of silver, leaving the mixture at rest to become clear, then filtering, and touching the surface of the fluid with a glass rod dipped in ammonia; if any arsenite of silver be present, it will be directly recognised by the yellow precipitate. But there is great difficulty in detecting the presence of the poison in the stomach. Besides examining the contents of this viscus by filtration and dilution, if no arsenic can be detected, Orfila advises the viscus to be cut in pieces, and then separately examined[1], by boiling the fragments in water and testing the decoction. In this case, the fragments should be boiled in distilled vinegar and water; and then a current of sulphuretted hydrogen gas passed through the filtered decoction, which will diffuse a fine yellow colour in the fluid if any arsenic be present: this, the sesquisulphuret of arsenic, when the fluid is boiled to drive off any superfluous sulphuretted hydrogen gas, falls as a lemon-yellow powder, which, if dried and mixed with black flux, and reduced, yields metallic arsenic. But the best of all tests is to throw some of the suspected fluid into a mixture of one part of sulphuric acid and six parts of water, and having added some pure zinc, as in the marginal cut, set fire to the gas as it issues from the jet, and hold over it a plate of glass; if any arsenious acid be present in the fluid, a spot of metallic arsenic will be obtained; and this may again be converted into arsenious acid by merely turning the plate, and passing under it the flame of a spirit lamp. The one hundred and fiftieth of a grain can be detected by this method.[2]

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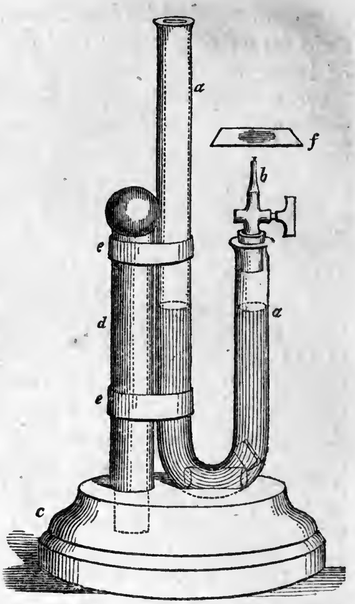
[1] *Traité des Poisons,* &c. par M. P. Orfila, vol. ii. p. 169.

[2] This beautiful test was suggested by Mr. Marsh of Woolwich.



Mr. Marsh's apparatus is a glass tube, *a, a,* bent into the form of a syphon, the shorter leg being five inches and the longer eight inches in length. A stop cock, *b,* ending in a jet of a fine bone, passes tightly through a hole in the axis of a soft sound cork, which fits air-tight into the opening of the lower bend of the tube: it may be rendered more tight by common turpentine luting. The apparatus is fixed on the stand, *c,* and attached to the pillar, *d,* by two elastic slips of Indian rubber, *e, e.* When the apparatus is to be used, the fluid to be examined, mixed with diluted sulphuric acid, is to be poured into the long leg until it stands in the short one about a quarter of an inch below the cork. A piece of glass rod, an inch long, is then to be put into the short leg, and afterwards a piece of sheet zinc bent double, which will fall down until stopped by the glass rod. The stopcock being then inserted and left open, in a few minutes the gas that issues should be lighted. If arsenious acid be present, metallic arsenic and a circle of oxide will be formed on the piece of glass, *f,* held over the flame.

When any of the solution of the poison which has been exhibited can be procured, more satisfactory results will be obtained from the examination of it than from that of the contents of the stomach. If a white powder be found in it, the most satisfactory proof is that of reducing this to the metallic form, as already described; but, if the whole of the arsenic be dissolved, it must then be tested by the different re-agents, or the process with hydrogen gas. One of the simplest methods as a preliminary step which I have tried is the following:—Into the suspected solution stir a moderate quantity of charcoal in powder; allow it to settle; then pour off the clear supernatant fluid, or filter the mixture; and when the powder which remains on the filter is dry, sprinkle some of it on a red-hot poker: if the solution contain arsenic, the odour of garlic will be rendered sensible. This effect becomes more obvious, if a few grains of dried subcarbonate of potassa be added to the dried charcoal-powder.[1] Dr. Christison has objected to this test as not likely to answer when the quantity of the arsenious acid is small[2]; but it is intended as a preliminary step only; and in almost all cases of suicide the quantity of the poison swallowed is large. Another method less objectionable I have to recommend: it is to heat the charcoal thus treated on platinum foil; if arsenic be present, it leaves a beautiful silvery mark on the foil from the arsenic forming an amalgam with the platinum.

The results from no single test should be relied upon. As a knowledge of the appearances produced by the four principal re-agents usually employed must greatly facilitate such an examination, we have constructed the following table from actual experiments: comparing the results obtained from solutions of arsenious acid with those from solutions of corrosive sublimate, tartarized antimony, and muriate of baryta, which are the only substances likely to be mistaken for it. It is necessary to remark that the broth employed was made with beef, and contained a moderate proportion of carrots, turnips, and onions, and that the coffee and the tea contained milk and sugar in the usual proportions employed in these beverages.

I shall add here the plan proposed by my late truly excellent friend and colleague, Dr. Turner, and Professor Christison of Edinburgh. They direct the stomach to be cut in pieces and boiled, in a porcelain vessel, in filtered water: then to filter the fluid, and add to it acetic acid sufficient to acidulate it. This acidulated solution is next to be subjected to a stream of sulphuretted hydrogen gas; then boiled, and the precipitate after filtration collected, washed with distilled water, and dried: it is then to be put into the small glass tube (*fig. a, page* 221), being careful that

[1] To ascertain the delicacy of this test, the following experiments were made:—Exp. 1. Half a drachm of arsenious acid being boiled in 1000 grains of water, and the fluid filtered when cold, it was found to retain twenty-eight grains of the white oxide in solution. Exp. 2. One drachm of this solution being mixed with two ounces of water in a cylindrical glass vessel, so as to form a solution which contained about one part of the acid for 592 parts of water, a scruple of finely-powdered charcoal was added, and the mixture being well agitated with a glass rod, and allowed to settle, was filtered. The powder, when dry, on being thrown upon a red-hot shovel, emitted a *very faint* odour of garlic. Exp. 3. The same as the former, except that two drachms of the solution were employed making the proportion of the acid to the water in the diluted solution as 1 to 286; the garlic odour was *very perceptible.* Exp. 4. Four drachms of the arsenical solution being employed, making the proportion of the acid to that of the water in the diluted solution as 1 to about 143, the garlic odour was *extremely strong.* From these experiments it is evident that this test will detect arsenic in any solution strong enough to act as a poison.

[2] Christison *on Poisons,* p. 196.

none of it touch the sides of the tube; to prevent which they should either be guarded, by introducing a roll of paper into the tube, or the small funnel, *b*, should be used. Next, some black flux must be introduced; and the lower part of the tube cautiously heated over the flame of a spirit-lamp, and next the bulb, until it be raised to full red heat. If arsenious acid was the poison, the decomposition of the sulphuret will afford a ring of metallic arsenic on the tube: but to determine this with more certainty, Dr. Turner proposes to separate the bulb of the tube and any portion of it containing the flux, by melting the tube and drawing it out. The crust in the remaining part is next to be driven up and down by the heat of the spirit-lamp, when, if it be arsenic, it will be formed into detached octahedral crystals, white, translucent, and easily recognised under the microscope. If more proof be wanted, these may be dissolved and tested with ammoniacal nitrate of silver, and ammoniacal sulphate of copper.[1] But the certainty and the simplicity of Mr. Marsh's process sets aside almost every other test. In legal inquiries, however, it is always proper to corroborate the results of the several tests by those of all.

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[1] *Edinburgh Journ. of Med. Science,* vol. ii. p. 254.

COMPARATIVE TABLE of the Precipitates obtained from Solutions of Arsenious Acid, of Bichloride of Mercury, of Tartarized Antimony, and of Muriate of Baryta, with different Tests.

1st TEST.—WATER SATURATED WITH SULPHURETTED HYDROGEN GAS.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from solutions of MURIATE of BARYTA.
Water - -	Bright golden yellow, which was deepened by the addition of a few drops of strong acetic acid.[1]	Yellow at the instant of its formation, but soon becoming blackish. On shaking the tube it changes to a dirty white.	Orange, curdy, partly suspended, partly thrown down. Ultimately bright orange.[3]	Heavy, and of a dirty dark brown colour.
Broth - -	Scarcely any at first, but on adding a few drops of strong acetic acid, a pale yellow.	Whitish yellow at first, quickly changing to mixed clots of yellow, black and white.	Pale orange at first, soon changing to a deeper bright orange.	Dirty pale brown, heavy.
Milk - -	Little change; but on the addition of a drop of strong acetic acid, a straw-coloured precipitate.	Light ochre, requiring for its formation a large quantity of the test.	Golden yellow, with a shade of orange.	Dirty nankeen, with a shade of brown.
Tea - -	At first, very pale yellow; after some time, a pale greenish yellow. The precipitate was curdy.[2]	Brownish white and yellow, mixed.	Deep orange, curdy, slowly formed: the supernatant fluid yellow.	Dirty light brown, deepening as it fell.
Madeira Wine	Turbid, pale yellow, the colour of the wine destroyed.	Muddy, gradually displaying small floating black flocculi.	Pale orange, long suspended.	The muriate mixed with white wine is milky.—Not tested.
Port Wine -	Turbid, pale yellow: the precipitate in both is very slowly formed.	Nearly as in the white wines, like clouds through the purple of the wine.	Dark, dirty brown.	Pale brown, heavy.
Coffee -	A deep golden yellow.	Brownish black.	Deep orange brown.	Not tried.
Gruel - -	Pale yellow, suspended.	Light brown, slowly formed.	Pale orange.	Not tried.

[1] This precipitate, dried upon a filter, and heated with some caustic potassa in a slender test tube, is decomposed in a few seconds, forming a sulphuret of potassa, whilst the arsenic is volatilized in its metallic form, and adheres to the sides of the tube. (*Orfila.*)

[2] All substances containing tannin in solution greatly impair the solvent influence of fluids in arsenious acid.

[3] Mr. Pereira states, that, when the solution of tartar emetic is very dilute, and sulphuretted gas passed through it only for a few seconds, the precipitate is of a lemon yellow, closely resembling that produced by arsenious acid. (*Med. Gaz.*, *April*, 1836.)

II. HYDRO-SULPHURET OF POTASSA.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of MURIATE of BARYTA.
Water - -	White, with the faintest tint of sulphur yellow, when a large quantity of the test was used.[1]	Black, mottled with yellow.	Bright orange.	Deep olive green.
Broth - -	Pale, but bright, sulphur yellow.	Clotted, heavy, black, mottled with grey.	Dull orange, heavy.	Lt. brown, partially suspended.
Milk - -	Bright golden yellow.	Black, clotted.	Orange.	Brown, greenish when the mixture was shaken.
Tea - -	A beautiful yellow.	Brownish black.	Reddish orange, flocculent.	Not tried.
Coffee - -	A deep golden yellow.[2]	Nearly black.	Deep brownish orange.	Not tried.
Maderia Wine	Sulphur yellow.	Dirty white, or slate colour.	Beautiful bright orange.	Vide 1st Table.
Port Wine -	Fawn colour.	Slate colour, with violet supernatant liquor.[3]	Dark brown, with a tinge of orange.	Violet, heavy.
Gruel - -	Bright queen's yellow.	Black dense clots.[4]	Orange clotted.	Dusky yellowish green.

III. SOLUTION OF SULPHATE OF COPPER, with the addition of Ammonia in Excess.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of MURIATE of BARYTA.
Water - -	Beautiful grass green. It completely disappeared on the addition of a few drops of strong acetic acid.[5]	White, thick, and heavy.	Pale whitish blue, very little thrown down.	Copious whitish blue.
Broth - -	Beautiful pale green, suspended.[6]	White, curdy, partly suspended, partly thrown down.	Pale whitish blue, with a tint of green.	Opaque, glaucous.
Milk - -	Pale greyish green.	Bluish white, curdy.	Whitish blue.	Curdy white, with a tinge of blue.
Tea - - -	Obscure olive, but scarcely a precipitate.	Dirty yellowish white, curdy.	Muddy, pale bluish green.	Greyish, heavy, supernatant fluid, yellowish green.
Coffee - -	Dark grass green.[7]	Dirty white.	Dirty bluish green.	Not tried.
Maderia Wine	Greyish, with a slight tinge of green.	Heavy clotted white, with a tint of green.	Æruginous blue.	Vide 1st Table.
Port Wine	Clotted, heavy, dark greenish grey.	Heavy, clotted, bluish grey.	Heavy, dirty slate blue.	Dirty violaceous grey.
Gruel -	Beautiful grass green.	Pale bluish white.	Pale bluish green.	Pale bluish green.

IV. NITRATE OF SILVER; a Drop or two of Ammonia being previously added to the Solutions.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of MURIATE of BARYTA.
Water - -	Copious bright sulphur yellow, falling in flocculi from the point of contact.[8]	Dull yellowish white, clotted, changing to dirty white.	Pale brown.	White, heavy; soon blackening.
Broth - -	White (owing to the chloride of sodium), but yellow when treated with nitric acid.	White, copious.	Brownish, mixed with much muriate of silver.	White, dense, curdy.
Milk - -	White, with a tint of yellow.	Dirty white.	Very pale, scarcely visible brown.	Not tried.
Tea - -	Yellowish white, which soon blackens.	Dirty white.	Dirty brown.	Not tried.
Coffee - -	Yellow, remaining unchanged.	White, changing to black.	Not tried.	Not tried.
Madeira Wine	Pale sulphur yellow.	Dirty white, changing to black.	White.	Vide 1st Table.
Port Wine -	White, becoming brown on exposure to the light.	Ibid.	Dirty white.	Heavy, dirty white.
Gruel - -	Yellowish.	Dense, dirty white clots.	Not tried.	Dense, clotted white.

1 The hydro-sulphuret, added to a solution of the phosphates, throws down a greenish-yellow precipitate, the supernatant fluid being yellow and turbid.

2 Lime water, also, added to coffee containing arsenious acid, throws down a yellow precipitate; although it precipitates the watery solution of arsenic white. (*Orfila.*)

3 Corrosive sublimate cannot be exhibited in port wine with an intention to commit murder (except by a self-murderer), as it changes the colour of the wine to pale violet.

4 All the precipitates by the sulphuret, when dried, and heated in a tube with iron filings, afford metallic mercury, which is volatilised, and shows itself in globules upon the sides of the tube.

5 This test is capable of detecting arsenious acid in a solution containing $\frac{1}{110000}$ of its weight. (*Orfila.*)

6 It has been suggested, that onions boiled in broth, or eaten so as to impregnate with their peculiar qualities the contents of the stomach, might produce the same effects on ammoniated sulphate of copper, as if arsenious acid were present; but although a green colour is produced, yet no precipitate falls as when arsenic is present.

7 Dr. Porter, of South Carolina, says, that sulp. of copper with ammonia produced the same coloured precipitate in coffee, which contains no arsenic! *American Journ. of Science*, vol. iii. p. 354.

8. A similar precipitate is formed by nitrate of silver, in a solution of any of the phosphates; and with chromate of potassa; but the fact of the precipitate being occasioned by arsenic is easily ascertained by testing a fresh portion of the solution with lime-water. If it contain arsenic, a copious white precipitate will be thrown down; if a phosphate only, there is scarcely any change, or at the most a translucent flocculent precipitate, which remains long suspended. A new method of employing this test was suggested by Dr. Paris: it is to put upon a piece of clean white paper a broad streak of the suspected fluid; and then run lightly over it a stick of lunar caustic. This is an excellent test, when modified, as I have elsewhere (*London Med. Repository*, vol. viii. p. 178.) suggested, by brushing the streak lightly over with liquid ammonia, immediately after the application of the caustic; if arsenic be present, a bright queen's yellow is instantly produced, which remains permanent for nearly an hour; but when the lunar caustic produces a bright yellow before the ammonia is applied, we may suspect the presence of some phosphate rather than arsenic.

ARTEMISIA. *Spec. Plant. Willd.* iii. 1815.

Cl. 19. *Ord.* 2. Syngenesia Polygamia Superflua. *Nat. Ord.* Compositæ.

G. 1473. *Receptacle* subvillous or almost naked. *Seed-down* none. *Cal.* imbricate, with roundish converging scales. *Cor.* without rays.

*** *Herbaceous, with the stem somewhat branching, the flowers in panicles, the leaves compound.*

Species 26. A. *santonica,* Tartarian Southernwood. *Med. Bot. 3d edit.* 61. *t.* 23.

——— 63. A. *Absinthium.* Common Wormwood. *Med. Bot. 3d edit.* 54. *t.* 22. *Smith's Flora Brit.* 864.

**** *Shrubby, with a branched stem and simple leaves.*

Species 71. A. *chinensis.* Chinese wormwood.

1. ARTEMISIA SANTONICA.

Officinal. ARTEMISIÆ SANTONICÆ CACUMINA, *Edin.* ARTEMISIA SANTONICUM, SEMINA, *Dub.* The tops and seeds of Tartarian Southernwood.

Syn. Sementine (*F.*), Tartarisches Beyfus, Wurmsamen (*G.*), Santonico, Seme Santo (*I.*).

This species of artemisia is a native of Tartary and Persia; but it is cultivated in our gardens, flowering in September. The root is perennial; and the plant has the habits of indigenous field southernwood, but is erect. The stem is panicled, rising two feet in height, and rather hoary. The lower leaves are pinnate, much cut, linear, and hoary. The branches are wand-like, with alternate racemes, recurved, and having flowers all looking the same way. The flowers are solitary and cylindrical. In the fruiting plant all the stems are erect, and lose their hoariness. The leaves on the branches are very small, linear, and undivided. The receptacle is naked.[1]

The *qualities* and *medical properties* of this plant are nearly the same as those of the other species of artemisia; and it may be used for the same purposes. According to the analysis of M. Wackenroder, it contains of a bitter principle, 20·25; brown, bitter resin, 4·45; a green, acrid, aromatic resin, 6·65; cerine, 0·35; gummy extractive, 15·50; ulmine, 8·60; mulate of lime and silex, 2; woody fibre, 35·44; and earthy matter, 6·70, in 100 parts. The worm-seeds (*semina Santonici*) of the former pharmacopœias, which were supposed to be the production of this plant, are now properly rejected, as their place can be well supplied with anthelmintics of more certainty.

2. ARTEMISIA ABSINTHIUM.[2]

Officinal. ABSINTHIUM, *Lond.* ARTEMISIÆ-ABSINTHII FOLIA, SUMMITATES, *Edin. Dub.* The leaves and flowering tops of Wormwood.

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[1] Willdenow, iii. 1827.

[2] Αψινθιον, Dioscoridis.

Syn. Absinthe commun (*F.*), Wormuth (*G.*), Alsem (*Dutch*), Malurt (*Danish*), Malert (*Swed.*), Piolun (*Polish*), Polin (*Russian*), Assenzio (*I.*), Artemisio axenjo (*S.*), Losna (*Portug.*).

Common wormwood is an indigenous perennial plant growing in dry waste places, and flowering in August. The greater part, however, of that which is used for medicinal purposes is cultivated in the physical gardens.[1] The root is somewhat woody, and branched. The stems rise nearly erect to the height of two or three feet; are branching, angled, and furrowed, with the summits panicled. The lower leaves are bipinnate; the upper pinnatifid or digitated; with oblong, obtuse, very entire segments. The racemes are erect, and the flowers pedicellated, nodding, hemispherical, and of a brownish-yellow colour. The florets of the disc are numerous; but those of the ray few: and the receptacle is covered with white silky hairs, shorter than the calyx.

Qualities.—The odour of common wormwood is strong; and although fragrant, yet to many persons it is very disagreeable: the taste is intensely bitter, slightly pungent, and nauseous. These qualities are given out both to water and to alcohol; and a dark green volatile oil, on which the odour depends, is obtained by distillation with water. The watery infusion of the plant has a pale olive colour: sulphate of iron, and of zinc, slowly deepen it to a black; and acetate of lead throws down a yellowish-green flocculent precipitate; but it is not affected by tartarized antimony. The active parts of the plant seem to be extractive, volatile oil which is not in the least bitter, and a small portion of resin. Kunsmuller[2] found in the residue of 12 ounces of the plant after infusion, besides other things, 59 grains of carbonate of lime.

Medical properties and uses.—Common wormwood is tonic, and anthelmintic; and when externally applied, it is said to be discutient and antiseptic. It has been used with advantage in intermittents, gout, scurvy, and dropsy; and although modern practitioners will scarcely rely on its efficacy in these complaints, yet it is undoubtedly of some value as a stomachic in dyspeptic and hypochondriacal affections. When it is desirable to free the remedy from its narcotic property, it should be given in decoction, as the boiling dissipates the essential oil on which this depends. The powdered root is much relied upon in Germany for the cure of epilepsy. It must be powdered only when wanted for use: the dose for an adult is from gr. l. to gr. lxx. This dose is given in hot beer

[1] A good deal is cultivated at Mitcham in Surrey, chiefly for the seed, which is sold to the rectifiers of British spirits at about 30*s*. per cwt.—*Stevenson's Survey*, p. 378.

[2] *Ann. de Chym.* vi. p. 35.

an hour before the paroxysm is expected. The sensible effect is powerful sweating.[1] I have used the herbaceous part of the plant in the same manner with decided advantage. The dose in substance is ℈j. to ℈ij. and of the infusion, made by macerating ʒvj. of the plant in f ℥xij. of boiling water, f ℥j. to f ʒxij., which may be given three or four times a day.[2]

Officinal preparations.—*Extractum Absinthii,* D.

3. ARTEMISIA CHINENSIS.

Officinal. ARTEMISIA CHINENSIS ET A. INDICA, FOLIA, MOXA, *Dub.* MOXA.

Syn. Khi-ngai; Gaetsaou (*Chinese*).

This species of Artemisia is a native of China; but it grows readily in the open air in this country. It is a shrubby plant, with tomentose leaves, about a finger-breadth in length: the lower leaves are wedge-shaped and trilobed; the upper, lanceolate and obtuse. The flowers which are produced on the summits of the twigs are in dense, frequently ovate, simple racemes.

For the preparation of Moxa, the plant is collected early in the morning, when it is still wet with dew: it is next hung up, in a free current of dry air, in a shady place, until it is perfectly dry; the leaves are then bruised in a mortar, and afterwards rubbed between the hands until the downy part is separated from the woody fibre. It is this downy matter, rolled into cones, about the height of the breadth of the little finger, that constitutes the Chinese Moxa. The Chinese employ several other species of Artemisia, for the preparation of moxas: in Europe moxas are now made of various materials; and almost any combustible will serve, if the combustion be maintained by blowing upon it; but those moxas which burn spontaneously are preferred. Cotton, dipped in a solution of nitrate of potassa, and rolled into little cylinders, is frequently used: the pith of the sun-flower, helianthus *annuus*, as it burns spontaneously, constitutes the greater part of the French moxas; and these are made either solid or hollow, the former being used when a deep eschar is not required; the latter when it is considered necessary. In Lapland moxas are prepared from a species of fungus, which is found on old birch-trees.

Medical properties and uses.—Prepared Artemisia Chinensis, Moxa, burnt upon the body, acts as a powerful counter-irritant, allaying deep-seated pains and inflammation: it is, therefore, useful in gout, rheumatism, obstinate headach, vertigo, white swellings of joints, and many local diseases, in

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[1] *Hufeland's Journ.* 1824.

[2] Purl is an infusion of wormwood in ale.

which counter-irritation proves useful. The most common mode of using Moxa is to place the little cone, or cylinder, into which it is rolled, upon the skin; and having set fire to the summit, to allow it to burn to the base. In some cases, however, it is not requisite to place the Moxa on the skin, but only to hold it, in an ignited state, at a small distance from the affected part, moving it backwards and forwards. As far as our own experience authorizes us to form an opinion, we prefer the use of the actual cautery to that of Moxa; and if proper care be taken to guard the surrounding skin from the radiation of the caloric of the hot iron, the pain is less than that produced by Moxa, whilst, at the same time, the slough is more perfect, and sooner thrown off. The best mode of applying the actual cautery is to cover the part with three or four doublings of cartridge paper, soaked in water, and then pressed between two boards. In this covering a hole is to be made, a little larger than the bulb of the iron to be employed. If the iron be made white hot, and the surrounding parts be thus protected, little pain is caused by the application of the cautery; for the life of the part to which it is applied is instantaneously destroyed, and radiation produces no effect on the surrounding skin.

ASARUM. *Spec. Plant. Willd.* ii. 858.

Cl. 11. *Ord.* 1. Dodecandria Monogynia. *Nat. ord.* Aristolochiaceæ.

G. 925. *Calyx* three or four cleft, placed on the germen. *Corolla* none. *Capsule* coriaceous crowned.

Spec. 1. A. *Europæum.*[1] Asarabacca. *Med. Bot. 3d edit. t.* 66. *Eng. Bot. t.* 1083. *Smith, Flora Brit.* 509.

Officinal. ASARI FOLIA, *Lond. Edin.* ASARUM EUROPÆUM; FOLIA, *Dub.* Asarabacca leaves.

Syn. Asaret, Cabaret (*F.*), Hazelwurtzel (*G.*), Hazelwort (*Dutch*), Hasselurt (*Dan.*), Kopytnik (*Polish*), Asaro, la bacchera (*I.*), Asaro de Europa (*S.*), Hasselört (*Swed.*), Asāroon (*Arab.*), Tuckir (*Hind.*), Mootriennjavia (*Tam.*).

This is a perennial plant, the geographical limits of which extend from 60° to 37° N. latitude: it is, consequently, a native of several parts of England, particularly Lancashire and Westmoreland: growing in woods and shady places; and flowering in May. The root is creeping, fleshy, and fibrous. The stem short, round, simple, pubescent, generally bearing two leaves only, and one flower. The leaves are opposite, on foot-stalks three inches long, of a kidney shape, entire, somewhat hairy, and of a deep shining green colour. The flower is on a short terminal peduncle of an herbaceous colour on the outside, and dusky purple within; and is in some degree

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[1] Ασαρον Dioscoridis. The Arabic word *Asāroon* signifies *astringency.*

hid under the leaves: the calyx is bell-shaped and three-cleft, with the points of the segments, which are erect, turned inwards; there is no corolla: the filaments are produced beyond the anthers into a hook or little horn; and the style is a cylindrical column, crowned with a six-parted, reddish stigma. The seeds are few, contained in a six-celled, inferior, coriaceous capsule, egg-shaped, and crowned with a persistent calyx.

As a great deal of the acrimony of Asarabacca is lost by keeping, the leaves should be used in as recent a state as possible; but when perfectly dried they keep. They should be dried without the application of much heat.[1]

Qualities.—The recent leaves are nearly inodorous: their taste slightly aromatic, bitter, acrid, and nauseous. The decoction is inert; but the watery infusion, which has the colour of brandy, possesses the sensible qualities of the leaves. Sulphate of iron changes the colour to a deep olive, throwing down a greyish precipitate. The recent root when distilled yields a volatile oil which smells like camphor; but this is not obtained from the dried root. According to the analysis of MM. Lassaigne and Fenueille, Asarabacca contains camphor, an emetic principle resembling cytisina, a volatile oil, fixed oil, citric acid gum, and fecula.[2] The recent root possesses emetic properties.

Medical properties and uses.—The leaves of Asarabacca are emetic, cathartic, and diuretic; but in modern practice they are never used except as an errhine; and, perhaps, as Dr. Cullen has remarked, they form the most useful species of this genus of local stimulants. A proper dose snuffed up the nose for a few successive evenings, at bed-time, occasions a copious discharge from the nostrils, which continues to flow for several days. They have been found particularly beneficial in cephalæa, obstinate toothaches, chronic ophthalmia, and lethargic affections. The dose of the powdered leaves is grs. iij. to grs. v., which should be repeated every night until the full effect is produced, avoiding exposure to cold during its use.

Officinal preparation.—*Pulvis Asari compositus,* E. D.

ASSAFŒTIDÆ GUMMI RESINA. Vide *Ferula Assafœtida.*

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[1] The roots which are not ordered in the British pharmacopœias, contain the same acrid principle as Arum; and are violently emetic and cathartic. Their odour, which is not unlike that of Valerian, is said to prove fatal to moles. *St. Hilaire, Expos. des Fam. Nat.* vi. 174.

[2] *Journ. de Pharmacie,* vol. vi. p. 56.

ASPIDIUM. *Flora Britannica*, Smith, 1118.
Cl. 24. *Ord.* 1. Cryptogamia Filicis. *Nat. ord.* Filices.
G. 429. (*Smith.*) *Fructification* in roundish points, scattered, not marginal. *Involucre* umbilicated, open almost on every side.
** *Front nearly bipinnate.*
Species 4. A. *Filix mas.*[1] Male Fern-root. *Med. Bot. 3d edit. t.* 267. (*Polypodium Filix mas.*) *Eng. Bot.* 1458. *Smith, Flor. Brit.*
Officinal. ASPIDIUM, *Lond.* ASPIDII FILICIS MARIS RADIX, *Edin.* ASPIDIUM FILIX MAS; RADIX, *Dub.* Root of the Male Fern.

Syn. Polypode commun (*F.*), Johanniswurtzel (*G.*), Felie Maschia (*I.*), Polypodio helecho masculino (*S.*).

This is a common, indigenous, perennial plant, growing in woods and shady places, and flowering in June and July. The root consists of many matted fibres, forming a tufty or cespitose head, of a blackish colour and scaly. The leaves or fronds grow in circular tufts, from a foot to four feet in height, with the stype and midrip chaffy. They are of a bright green colour, lanceolate and pinnate. The pinnæ are at first alternate, increasing in size from the base towards the middle, then decreasing towards the summit of the leaf; each being deeply subdivided into linear, obtuse, parallel lobes, crenate on the edges. The fructification is like small dots on the back of each lobe, placed in two rows near the base, and distant from the edges; composed of a kidney-shaped shield or involucre, and a pale brown capsule, with a saffron-coloured elastic ring.

Qualities.—The dried root is nearly inodorous: the taste at first sweetish, then slightly bitter, sub-astringent; and mucilaginous when chewed. It varies much in its properties according to the season of the year in which it is taken up; and it becomes perfectly inert when kept upwards of two years. They should be collected in summer, at which time they have a greenish colour, and a nauseous smell; and do not change when they are dried in the air. By a late analysis of M. Morin it was found to contain a fatty substance of a nauseous odour and disagreeable taste, heavier than water; gallic and acetic acids, uncrystallizable sugar, tannin, starch, and a variety of gelatine insoluble in water and alcohol. He found that it also contained subcarbonate, sulphate, and hydrochlorate of potassa, carbonate and phosphate of lime, alumine, silex, and oxide of iron.[2] M. Peschier of Geneva supposes that he has discovered the active principle of this root. He separates adipocire by treating the root with sulphuric acid, until the adipocire forms as a mamillated sub-

[1] Θηλυπτερις Dioscoridis.

[2] *Ann. de Chym.* xxvi. 219.

stance, which he separates from the fluid by pressure. This fluid, by farther analysis, yields resin, a volatile oil which is the active principle, a fixed oil, colouring matter, extractive, and some salts. The internal part of the root is the portion that is medicinally used.

Medical properties and uses.—This root is astringent and has been celebrated both by the ancients and the moderns as a powerful anthelmintic. It appears to have been used as such by Theophrastus, Dioscorides, and Galen; but although recommended by Hoffman, yet it was neglected by the moderns, until the publication of Madame Noufer's specific for the tape-worm by the French government, again brought it into notice. According to her plan of administering it, from one to three drachms of the powdered root are to be taken in a large cupful of water, in the morning, while the patient is in bed; and, two hours afterwards, a strong cathartic of calomel and gamboge, proportioned to the age and strength of the patient, is to be given; and, if necessary, the further operation promoted by a dose of purging salts: nothing but broth being taken till the worm come away. If this, however, did not happen on the same day, the process was ordered to be repeated on the next day.

M. Peschier says 30 drops of the oil will kill a tænia, and this quantity is contained in ʒ iij. of the powdered root, which should be taken on an empty stomach.

ASTRAGALUS. *Spec. Plant. Willd.* iii. 1256.
Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.
G. 1379. *Legume* generally two-celled, gibbous.
Species. A. *verus.* True Astragalus. *Olivier, Voy. dans l'Empire Ottoman,* v. 342. *pl.* 44. A. *creticus.* De Candolle Astragologi.
Officinal. TRAGACANTHA, *Lond.* ASTRAGALI TRAGACANTHÆ GUMMI, *Edin.* ASTRAGALUS CRETICUS; GUMMI, *Dub.* Tragacanth.

Syn. Gomme Adragant (*F.*), Traganth (*G.*), Gom Drangant (*Dutch*), Draganti (*I.*), Gomo Tragacantho (*S.*), Alcatira (*Port.*), Sumégh ulkassael (*Arab.*), Xuttivah (*H.*), Vaeberno cottuy pisin (*Tam.*).

The shrubs, for they are probably many, which yield Tragacanth, are natives of the north of Persia; and there are yet just reasons for doubting whether the Astragalus *verus* is the only one. This plant is called Kurn, in Persia, and flowers in July and August. It rises two or three feet only in height, on a stem about an inch in thickness; with many branches closely crowded together, and covered with imbricated scales and spines, formed from the petioles of the former year. The leaves, which scarcely exceed half an inch in length, are composed of six, seven, or eight pairs of opposite villous, stiff, pointed leaflets; and the midrib is terminated with a sharp yellowish point. The flowers are small, yellow, and proceed from the axillæ of the leaves, with cottony bractes. The calyx is five-toothed, and shorter than the corolla, which is papilionaceous.[1]

The gum exudes in summer, more or less copiously, according to the heat of the weather, in tortuous filaments, which are allowed to dry on the plant before being collected. A large portion of the Tragacanth collected in Persia is sent to India, Bagdad, Bussorah, and Russia: but what we receive is sent to Aleppo, whence it is exported, packed in cases.

Qualities.—Good Gum Tragacanth is inodorous; impressing a very slightly bitter taste as it softens in the mouth. It has a whitish colour; is semi-transparent, and in very thin, wrinkled, vermiform pieces: brittle, but not easily pulverised, except in frosty weather, or in a warmed mortar. Its sp. gr. is 1·384. It swells and softens in water, but does not form a homogeneous fluid mucilage, unless triturated after digestion with a large portion of water: but when the water is acidulated with any of the mineral acids, a small portion of it is dissolved. Bucholz regards the insoluble part as a peculiar substance, which he names *Tragacanthiu.* Tragacanth is wholly insoluble in alcohol and ether. Dr. John has given the name of *Cerasin* to this species of Gum, from its being exuded pure from the Cherry-tree, Prunus *cerasus.* Its mucilage differs from that of Acacia gum in being precipitated by the acetate of lead, sulphate of copper, nitrate of mercury, and muriate of tin; and not by silicated potassa[2], nor by the persulphate of iron. It also contains some fecula: it is tinted blue by iodine.

Medical properties and uses.—Gum Tragacanth is demulcent; and may answer the purposes of the Acacia gum; being even better adapted for allaying tickling cough, and sheathing the fauces in catarrhal affections, owing to its greater viscidity. It is chiefly, however, employed for pharmaceutical purposes. The dose is grs. x. to ʒ j. or more.

Officinal preparations.—*Mucilago Astragali Tragacanthæ,* E. D. *Pulvis Tragacanthæ comp.* L. *Confectio Opii,* L. D.

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[1] Before Oliver suggested that the species of *Astragalus* above described yields the Tragacanth of commerce, this gummy substance was supposed to be yielded by the *A. Tragacantha* of Linnæus, on the authority of Tournefort; or the *A. gummifera*, on that of M. de la Billardière. Perhaps all these species yield it, although the *A. verus* or the *A. creticus* be that from which it is more generally procured. Siéber affirms that the true tragacanth plant is the *A. aristatus,* which grows upon Mount Ida, where the Tragacanth is gathered in great abundance. The Kuttirah gum from India has been found not to answer the purposes of the ordinary Tragacanth.

[2] Bostock, *Nicholson's Journ.* lviii. 30.

ATROPA.[1] *Spec. Plant. Willd.* i. 1016.
Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solaneæ.
G. 381. *Cor.* bell-shaped. *Stam.* distant. *Berry* globular, 2-celled.
Species 2. A. *Belladonna.* Deadly Nightshade, or Dwale. *Med. Bot. 3d ed.* 230. *t.* 82. *Eng. Bot.* 592. *Smith, Flor. Brit.* 253.
Officinal. BELLADONNA, *Lond.*—FOLIA ET RADIX, *Dub.* ATROPÆ BELLADONNÆ FOLIA, *Edin.* Deadly Nightshade leaves and root. Deadly Dwale.

Syn. Belledame (*F.*), Tollkraut (*G.*), Doodkruid (*Dutch*), Wargbar (*Dan. Swed.*), Belladonna (*I. S. Portug.*), Psinki (*Pol.*), Sug-ungger (*H.*), Robuturbuc (*Pers.*), Inubus salel (*Arab.*).

Belladonna is an indigenous perennial, found in many parts of Great Britain, particularly in shady places where the soil is calcareous, flowering in June, and ripening its berries in September. The root is thick, fleshy, and creeping; sending up several erect, purple-coloured, herbaceous, annual stems, about three feet in height, branching, leafy, round, and somewhat fleshy. The leaves are lateral, in pairs of unequal size, decurrent, on short petioles, egg-shaped, pointed, entire; of a dusky green colour above, and paler below; soft and fatty to the touch. The flowers are supported on one-flowered, solitary, axillary peduncles; large, drooping, and having a faint narcotic odour: the calyx is green, persistent, and deeply divided into five ovate segments: the corolla bell-shaped, of a lurid hue externally, and within dusky, or brownish violet, with a yellow variegated base, enclosing five filaments shorter than the corolla, nodding, and bearing large anthers: with a pyramidal germ, supporting a long simple style and two-lobed stigma. The ripe berry is large, seated within the calyx, roundish, with a longitudinal furrow on each side, shining, smooth, and of a deep purple colour; containing many seeds, and a sweetish, violet-coloured juice.

Qualities.—The leaves of Belladonna are inodorous: the taste is slightly nauseous, sweetish, and subacrid. They do not lose their active properties by drying. Vauquelin found that they contain a substance resembling animal albumen, salts with a base of potassa, and a bitter principle, soluble in alcohol; this was afterwards found by M. Runge to be an alkali on which the narcotic quality of the plant depends; and which has since been examined by M. Brandes, who has named it *Atropia.*[2] The seeds yield the largest proportion of

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[1] Named after Ατροπος, one of the Fates.

[2] To obtain it, boil the dried leaves in distilled water; press the decoction out and filter, after the albumen has been thrown down by sulphuric acid added as long as any precipitate is formed; then to the filtered fluid add potassa as long as a precipitate is produced: leave at rest, and decant off the fluid; then wash this precipitate in pure water, redissolve it in muriatic acid, and again precipitate

this principle, and it is also obtained from the roots. Every part of the plant is poisonous; and children and the ignorant have often suffered from eating the berries, the beautiful appearance and sweet taste of which render them very alluring. The symptons which they induce are those ot intoxication, accompanied with fits of laughter and violent gestures [1]; great thirst, difficulty of deglutition, nausea, dilatation of the pupil, with the eyelids drawn down; redness and tumefaction of the face, stupor or delirium, a low and feeble pulse, paralysis of the intestines, convulsions, and death. Dissections show that the stomach and intestines have been inflamed; and after death the body swells; blood flows from the nose, mouth, and ears; and the most rapid decomposition ensues. The best mode of averting these fatal effects is by exhibiting emetics of sulphate of zinc, or of copper, and assisting their operation by irritating the fauces: then evacuating the bowels by active purgatives and glysters; and following these by large doses of vinegar and other vegetable acids. The recovery is always slow. If M. Runge's experiments be correct, lime-water should be the antidote for poisoning by Belladonna.

Medical properties and uses.—The deleterious effects we have enumerated demonstrate that Belladonna is a very powerful narcotic. It is, besides, diaphoretic and diuretic. When injudiciously or incautiously given, or when it is taken for a considerable length of time, even in small doses, it is apt to induce a dryness and stricture of the pharynx and adjoining parts of the œsophagus, sickness, vertigo, and dimness of sight: symptoms sufficiently indicative of the necessity of suspending its use for some time, and giving it in smaller doses when it is resumed. The internal administration of Belladonna appears to have been suggested by the advantages resulting

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by ammonia. This is Atropia. It is in white, silky, acicular crystals, inodorous, bitter, little soluble in cold water, or even alcohol, but very soluble in boiling alcohol; from which, however, it is deposited on cooling.—*Ann. of Phil.* vol. i. pp. 2, 3. (new series.) *Schweigger's Journ.* vol. xxviii. p. 1. M. Runge, however, asserts that Atropia is destroyed by alkalies; and, consequently, they cannot be used to obtain it. He recommends hydrate of magnesia, procured by decomposing the sulphate of magnesia by potassa. This hydrate just precipitated is added to the aqueous infusion of Belladonna; and the whole evaporated to dryness. The residue is then pulverized, and treated with alcohol. The crystalline mass obtained from the spontaneous evaporation of the alcoholic solution filtered, is *Atropia.*—*Ann. de Chym.* xxvii. p. 32.

[1] Buchanan, the Scottish historian, states that the victory of Macbeth over the Danes was obtained chiefly by mixing this plant in a donation of wine and ale, which was sent by the Scots to Sweno during a truce. He describes very accurately the botanical characters of the plant; and adds, "vis fructui, radici, ac maxime semini somnifera, et quæ in amentiam, si largius sumantur, agat."—*Rerum Scot. Hist.* lib. vii. sect. 6.

from its external application. Lambergen, Cullen, De Haen, Junker, and others, found it very serviceable in the early stage of scirrhous and cancerous affections. Ritcher, Brera, Munch, Mayerne, and others, have asserted that it cures hydrophobia; and it has also been given with advantage in obstinate intermittents, chronic rheumatism, gout, paralysis, amaurosis, epilepsy, and pertussis; in the last of which diseases we can speak of its efficacy from our own experience. Hufeland asserts that it has the power of allaying convulsions arising from scrofulous irritation; and its beneficial effects in neuralgia facialis have been well ascertained.[1] Its narcotic powers are certainly great; but they have not been found sufficiently constant and permanent to insure its general use. Externally, used either as a fomentation, or the dried leaves powdered and sprinkled over the parts, it is of singular efficacy in diminishing the pain of cancerous and ill-conditioned sores; it obtunds the pain of hæmorrhoids; and as the infusion, when dropped into the eye, produces a great dilatation of the pupil, it was proposed by Professor Reimarus for dilating the pupil previous to the extraction of the cataract; and the extract is now commonly used in this country for the same purpose.[2] M. Dupuytren gives Belladonna internally in scrofulous ophthalmia, and inflammation of the retina. M. Runge[3] ascertained that this power is destroyed by alkaline solutions. "Its operation appears to be limited to the radiated fibres of the iris."[4] By continued use it loses its effect; but regains it after the application has been, for a short time, suspended. Hahnemann and Professor Koreff have stated that Belladonna given during the prevalence of Scarlatina has the power of protecting the individual who takes it from the infection. Dr. Randhahn, physician of the Orphan Hospital of Langendorf, in Prussia, has confirmed this fact, by experiments on 160 children exposed to the contagion in the above-named hospital. It appears to possess some efficacy in erysipelas.

Belladonna may be given in substance, beginning with one grain of the dry leaves powdered, and gradually increasing the dose until it displays its effects on the habit. An infusion, made with one scruple of the dry leaves in ten fluid ounces of boiling water is also used: two ounces may be given daily, and the dose cautiously increased. From what has been stated

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[1] *Observations on the Use of Belladonna,* &c. by John Bailey, 8vo. 1817.
[2] *Med. and Phys. Journal,* No. xxxii.
[3] *Ann. de Chym.* xxvii. 32.
[4] *Adam's Practical Observations on Ectropium,* &c. 8vo. p. 44.

regarding the effect of alkalies on Belladonna, these bodies are incompatible in formula with it.

Officinal preparations.—*Extract. Belladonnæ*, L. *Succus spissatus Atropæ Belladonnæ*, E. D.

AURANTII CORTEX, FLORES et OLEUM. Vide *Citrus Aurantium*.

AVENA. *Spec. Plant. Willd.* i. 443.

Cl. 3. *Ord.* 2. Triandria Digynia. *Nat. ord.* Graminaceæ.

G. 142. *Calyx* two-valved, many-flowered; with a twisted awn on the back.

Species 13. A. *sativa.*[1] Common Oat.

Off. AVENÆ SEMINA, *Lond. Edin.* FARINA EX SEMINIBUS, *Dub.* The seeds of the Oat decorticated, called Grits; and the seeds ground into meal.

Syn. Gruau d'avoine (*F.*) Habergrütze (*G.*), Gewoone haver (*Dutch*), Havre (*Dan.*), Hafra (*Swed.*), Avena (*I.*), Avena (*S.*), Avea (*Portug.*).

The oat was found by Anson growing wild upon the island of Juan Fernandez, on the coast of Chili; but the place whence it was first brought to Europe has never been satisfactorily ascertained. The root is annual and fibrous, pushing up a culm or straw, which rises above two feet in height. The inflorescence is a loose panicle, with the subdivisions on long pendulous peduncles. The glumes of the calyx are two, marked with lines, pointed, unequal, and larger than the flower. There are usually two flowers and seeds in each calyx: they are alternate, conical: the smaller one is awnless; the larger puts forth a strong, two-coloured, bent awn from the middle of the back of the glumule; both seeds are fertile.

There are many varieties of this species of grain cultivated in the north of Europe.[2] In this country, that which is called *the potato-oat* is considered the best; its grain is short and plump, with a thin, clean, bright, pale straw-coloured cuticle.

Oats, when freed from their cuticle only, are named grits; in which state, and ground into meal, they are dietetically and medicinally used. In both states they yield their fecula to water by coction; and form a nutritious amylaceous gruel. The nutrient qualities of oats are well known. In many places the meal forms the chief support of the poor; and for infants who are unfortunately deprived of their natural and proper nourishment, the breast milk, no better substitute can

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[1] Βοῶμος Dioscoridis.

[2] In Scotland, some parts of England, a part of Siberia, and in the northern parts of Norway and Sweden, oats form the chief part of the vegetable nutriment of the inhabitants.

be adopted than thin grit gruel, mixed with good cow's milk. The gruel should not be kept longer than forty-eight hours, as it becomes acescent after that period.[1]

Qualities. — Oats are inodorous; and taste very slightly, but not unpleasantly, bitter. They have not been chymically examined; but the greater part of their substance appears to consist of fecula or starch.

Medical properties and uses. — Gruels, or decoctions of grits or of oatmeal, are excellent demulcents, and therefore very frequently prescribed in inflammatory diseases, diarrhœa, cholera, dysentery, calculus, and febrile affections. They may be sweetened, acidified, or used plain. They are also used locally in glysters; and the meal boiled with water into a thick paste forms an excellent suppurative poultice.

Officinal preparation.—*Pulvis pro Cataplasmate,* D.

BALSAMODENDRON. *Fée, Cours d'Histoire Nat. Pharm. t.* 1. p. 641.

Sp. — B. *Myrrha. Nees von Essenbeck.*

Cl. Octandria. *Ord.* Monogynia, *Linn.* *Nat. ord.* Burseraceæ.

Officinal. MYRRHA.[2] *Lond. Edin. Dub.* Myrrh, a gum-resin.

Syn. Myrrhe (*F.*), Myrrhen (*G.*), Mirra (*I.*), Mirra (*S.*), Murra (*Russ.*), Murr. (*Arab.*), Ból (*H.*), Heera bol (*Duk.*), Vóla (*San.*), Valatipolum (*Tam.*), Manisan lebah (*Malay*), Madu (*Jav.*), Palendra bolum (*Tam.*).

The tree or plant which produces this gum-resin is a native of the borders of Arabia Felix, in the province of Gison. It remained long undescribed by naturalists; and the conjectures of Mr. Bruce in favour of its being a mimosa, were by no means satisfactory.[3] At length, however, it has been described by Nees von Essenbeck, on the authority of Ehrenberg, who has seen the mrryh collected from the bark. It is a small tree with a stunted trunk, with whitish gray bark, and rough abortive branches terminating in spines. The leaves are ternate, the leaflets obovate, blunt, obtusely toothed, the terminal one being largest. The fruit is oval, longitudinally furrowed, of a brown colour, and surrounded at the base by the persistent calyx. The juice exudes spontaneously, and concretes upon the bark.[4]

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1 The following is the simplest mode of making gruel: — Put three ounces of grits which have been washed into four pints of water, and boil slowly until the water be reduced one half; then strain through a sieve, to separate the undissolved part of the grits from the gruel.

2 Σμυρνα Dioscoridis. The name Μυῤῥα, used by Hippocrates, is derived from μυρον, an ointment. Professor Verey (*Journ. de Pharm.* 1820) derives it from the Phœnician word *mor* or *mur*. Myrrha, the daughter of Cinyras, king of Phœnicia, was metamorphosed into a tree, for being criminally in love with her father.

3 *Phil. Trans.* lxv. 413.

4 Fée Cours d'Hist. Nat. Pharm. 1. p. 641.

It exudes at first oily, then thickens, and from a yellowish-white colour gradually assumes a golden hue, and becomes red when dry. It is imported in chests, each containing from one to two hundred weight. Two kinds are found in the market, namely, the Abyssinian myrrh, which comes to us through the East Indies, and that produced in Arabia, which is brought by the way of Turkey.

Qualities. — Myrrh has a peculiar, rather fragrant odour, augmented when it is powdered, and a bitter aromatic taste. It softens in the mouth, adheres to the teeth when chewed, and is in small, irregularly shaped pieces, which can scarcely be called tears: they are translucent, of a reddish-yellow colour, brittle, breaking with a resinous fracture, and easily pulverized. It does not melt when heated, and is not very inflammable. Its specific gravity is 1·360.[1] Such are the characters of good Turkey myrrh: but the East Indian is often opaque, mixed with many impurities[2], and either white or of a dark colour, approaching nearly to black, with a disagreeable odour, in which case it should be rejected. This description appears to be the produce of old trees.

Myrrh is partially soluble in water, alcohol, and ether. In distillation with water, it yields an oil heavier than water. When it is triturated with very soft or distilled water, nearly the whole appears to be dissolved, forming an opaque, yellowish solution; but the greater part is deposited by rest, and not more than one third of the gum-resin is actually dissolved. The alcoholic tincture is rendered milky and opaque when mixed with water, but no precipitate appears. Braconnot asserts that 100 parts of myrrh consist of 23 of resin and 77 of gum; but my experiments lead to a somewhat different conclusion, and accord more with those of Pelletier, who found the proportions to be, 34·68 of resin and 65·32 of gum. Ether, digested on powdered myrrh, dissolved three parts in eight; and the tincture, evaporated on water, deposited two grains and a half of very bitter resin, and half a grain of extractive matter, which also tasted bitter. The part insoluble in the ether, was nearly all soluble in water, and afforded a solution resembling that of acacia gum; but differed from it in being precipitated by solutions of bichloride of mercury and of acetate of lead. Myrrh triturated with crystallized carbonate of alkalies is reduced to the form of a

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[1] *Annales de Chimie,* lxviii. 52.

[2] These are sometimes salt; and as salt is a production of the soil in Abyssinia, this is readily accounted for by the myrrh dropping on the ground.

tenacious fluid. When treated with nitric acid it yields oxalic acid. Hence myrrh seems to consist of resin, essential oil, extractive, and mucus, rather than gum. Brandes obtained from 502 parts of good myrrh 13 of volatile oil, 111·2 of balsamic resin, 27·8 of a resinoid soluble in alcohol, 271 of gummy matter, 3 of vegeto-animal matter, 3·71 of salts of potassa and of lime, 8 of foreign admixtures, and 17·8 of water. The volatile oil is heavier than water.

Medical properties and uses. — Myrrh is tonic and expectorant. In moderate doses it stimulates the stomach, promoting the appetite and digestion; but, in larger doses, increases the frequency of the pulse and augments the general heat of the body.[1] As a tonic, it is efficaciously given in cases of debility[2]; as amenorrhœa, chlorosis, and convalsecences; and in phthisis pulmonalis, when the inflammatory symptoms and hectic fever do not run high. Its use in phthisis has, indeed, been condemned by several physicians of great repute[3]; but when there is an evident ulceration of the lungs without much hectic, and the patient's strength is considerably reduced by the quantity of the expectorated matter, the proper exhibition of myrrh may be certainly productive of benefit. In the first-mentioned diseases, it is advantageously combined with aloes, cinchona, or other bitters and chalybeates; and in phthisis, with nitre, digitalis, opium, camphor, and the sulphate of iron or of zinc. Combined with oxide of zinc, it has been found extremely useful in the peculiar cough which sometimes accompanies pregnancy, and continues after abortion. As an expectorant, it is often employed in humoral asthma and chronic catarrh; and with the same view also has been given in phthisical affections: but as it cannot be employed with propriety in pulmonic cases, where there is much inflammatory action or hectic present, any advantage derived from its use in phthisis probably depends altogether on its tonic operation counteracting the exhaustion which is produced by a copious purulent expectoration. As a local stimulant, the alcoholic solution of myrrh diffused in water is used as a lotion in a spongy state of the gums, and for correcting the fœtid discharge of vitiated ulcers, particularly when connected with caries of the bone; and as a gargle in cynanche maligna.

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[1] Cullen, *Mat. Med.* ii. 123.

[2] It was formerly used for the cure of quartans; ʒj. in a glass of warm Cretan wine being given an hour before the paroxysm, and thrice repeated before the accession. Mathiolus, cap 67., says, "Hoc medicamento ego ipse curatus sum."

[3] Cullen. Fothergill.

Myrrh is administered in substance, or in the form of watery infusion, or of tincture properly diluted. The watery infusion is much less stimulant than any of the other preparations. A watery extract is ordered in some foreign pharmacopœias, and preferred by many physicians, from an idea that it is less heating than the gum-resin; but it is equally bitter, and is perhaps not different from a diminished dose of the myrrh.

Officinal preparations. — *Tinctura Myrrhæ*, L. E. D. *Tinctura Aloes composita*, L. *Tinctura Aloes et Myrrhæ*, E. *Tinct. Aloes Ætheria*, E. *Mistura Ferri comp.*, L. *Pilulæ Aloes cum Myrrhâ*, L. E. D. *Pilulæ Ferri compositæ*, L. *Pil. Galbani comp.*, L. D. *Pil. Assafœtidæ comp.*, E. *Pil. Rhei composita*, L. E.

BALSAMUM PERUVIANUM. Vide *Myroxylon Peruiferum.*

BALSAMUM TOLUTANUM. Vide *Myroxylum Peruiferum.*

BARYTA. Baryta.

Syn. Baryte (*F.*), Baryterde, Schwerede (*G.*), Barite, (*I.*).

This mineral substance does not exist, as far as we know, in an uncombined state; and its native combinations hitherto discovered are very few. It is found,

A. combined with carbonic acid:

Sp. 1. *Carbonate of baryta*, or *Witherite.*[1]

B. combined with sulphuric acid:

2. *Sulphate of baryta*, or *Heavy spar.*

Baryta is obtained by decomposing these fossils. It is not a simple substance, but a compound of a peculiar metallic base, named *barium* by Sir H. Davy[2], and oxygen, in equal proportions, making the equivalent 76·7.

1. CARBONATE OF BARYTA.

Officinal. BARYTÆ CARBONAS, *Lond.* CARBONAS BARYTÆ, *Edin.* Carbonate of Baryta.

Syn. Spath pésant, Carbonate de Baryte (*F.*), Schwerspath, Kohlonsaure Baryterde (*G.*), Ossicarbonato di Barite (*I.*).

This fossil is found native in Sweden, Scotland, and Cumberland, but in greatest abundance at Anglesark, in Lancashire. It usually occurs massive in veins, which traverse the

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[1] So named by Werner, after Dr. Withering, who discovered it native on Alston Moor, in Cumberland, in 1783.

[2] Mr. Murray proposes *barytum* instead of barium. — *Syst. of Chym.* ii. 205.

independent coal formation: and sometimes, although rarely, it is found crystallized. It is well known under the name of Witherite. The crystals are small, and their primitive form is yet undecided.

Qualities. — Carbonate of Baryta is inodorous and insipid, but it is nevertheless poisonous. Its colour is white, or yellowish grey: it is translucent, with a shining, somewhat resinous lustre; and breaks in one direction with a fracture intermediate between radiated and foliated, and in another uneven: the fragments wedge-shaped. The lustre of the principal fracture is glimmering, that of the cross glimmering and resinous. Its specific gravity is 4·338. When heated it becomes opaque; and is fused into a white enamel by the blowpipe; and, when pulverized, its powder phosphoresces when thrown on burning coals. It is nearly insoluble, requiring for its solution 4300 times its weight of cold water, and 2300 of boiling water. It dissolves with effervescence in diluted nitric acid, although the strong acid exerts no action on it. Carbonate of Baryta consists of 76·7 or 1 equivalent of Baryta and 22·12 or 1 equivalent of carbonic acid, making the equivalent of the salt 98·82.

Use. — It is only used for preparing the chloride. It may, however, be exhibited as a poison: it produces slight inflammation of the stomach; but acts chiefly on the brain, spine, and voluntary muscles[1]: and in this case the antidote is diluted sulphuric acid, as the sulphate which is thus formed is an inert salt.

Officinal preparation. — *Barii Chloridum,* L. *Murias Barytæ,* E. D.

2. SULPHATE OF BARYTA.

Officinal.—SULPHAS BARYTÆ, *Edin. Dub.* Sulphate of Baryta.

Syn. Sulfate de Baryte (*F.*), Schwefelsaures Baryterde(*G.*), Tungspat(*Swed.*), Ossisolfato di Barite (*I.*).

This combination of Baryta, which was formerly named *Ponderous spar,* is found native at Freyburg in Germany, and in many parts of the world. It is found almost always in veins; but sometimes it occurs in beds. It is occasionally obtained in powder, frequently in amorphous masses, and often in crystals.

Qualities. — Sulphate of Baryta is inodorous and insipid. Its colour is white, with shades of yellow, red, blue, or brown.

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[1] Professor Gmelin found that, in animals poisoned by the soluble salts of Baryta, the voluntary muscles lose their contractility; but the heart continues to contract for many minutes, even without the application of stimuli. — *Versuche über die Wirkungen,* &c. 1824.

It occurs transparent, semi-transparent, or only translucent; and is hard, brittle, and heavy, its specific gravity being from 4·448 to 4·865. The varieties of form of its crystals are numerous; but the primitive form is a right rhombic prism, the bases of which are rhombs with angles of 101° 30′ and 78° 30′.[1] The most common varieties of its crystals are the octahedron with oblique summits, the six or four sided prism, the hexangular table with bevelled edges; sometimes they are needle-form.[2] It breaks with a straight foliated fracture: the fragments are nearly rhomboidal, and have a shining, pearly, almost vitreous lustre. It is fused by the blow-pipe, and converted into the sulphuret; and is soluble in sulphuric acid only, from which it is precipitated by water. It consists of one equiv. of Baryta = 76·7 + one of acid = 40·1, making the equivalent of the salt = 116·8.

Use. — This barytic salt is unncessarily introduced into the list of materia medica. It is merely used as a substitute for preparing the chloride of barium, when the carbonate cannot be procured.

Officinal preparation.—*Barytæ Murias,* D. E.

BELLADONNA. Vide *Atropa Belladonna.*

BENZOINUM. Vide *Styrax Benzoin.*

BERGAMII OLEUM. Vide *Citrus Limetta Bergamium.*

BISTORTÆ RADIX. Vide *Polygonum Bistorta.*

BISMUTHUM. Bismuth. *Lond. Dub.*

Syn. Etain gris, Etain de glace, Bismuth (*F.*), Reiner Wismuth (*G.*), Bismut puro (*I.*).

This metal is not very widely diffused. Its ores are found chiefly in Saxony; and, less abundantly, in Sweden, France, and Cornwall. It is usually accompanied by cobalt. It most commonly occurs in the state of metal, and, therefore, its ores are not much diversified. The following are the states in which bismuth is found:—

A. In its metallic state:

i. Alloys.	*Sp.* 1. *Native Bismuth.*

B. United with other metals and sulphur:

ii. Sulphurets.	2. *Common Sulphuret.* 3. *Needle Ore.* 4. *Cupreous Sulphuret.*

C. United with oxygen:

iii. Oxide.	5. *Bismuth Ochre.*

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[1] Haüy, *Thomson's Chymistry,* vol. iv. p. 369.
[2] *Thomson's Chymistry,* 5th edit. vol. iii. p. 413.

The ancient German miners regarded it as incomplete silver, or silver beginning to form, and termed it *tectum argenti*; and so late as the close of the 17th century it was considered a species of lead.

Bismuth was for some time considered as an alloy by chymists; but this opinion was gradually discovered to be erroneous; and it now ranks as a distinct metal.[1]

Bismuth appears as if formed of broad shining plates adhering to one another, of a reddish white colour; and is both insipid and inodorous. Its specific gravity is 9·822. It is not very brittle; and is rather softer than copper, but is not very malleable, and breaks when struck smartly by a hammer, and is pulverizable: it soon loses its lustre when exposed to the air, but remains unaltered under water. It cannot be drawn out into wire. It melts at 476° of Fahr., in which state its surface is oxidized in pellicles like lead: it evaporates in a higher temperature, and may be distilled over in close vessels. It is inflammable in a strong red heat, burning with a faint blue flame, and emitting a yellow smoke, which condenses into an oxide, insipid, unvolatilizable, insoluble in water. The oxide when strongly heated melts, and becomes darker coloured; and it may be sublimed at a heat below that which is required to fuse it. It is easily reduced when heated in conjunction with combustible bodies, the affinity between bismuth and oxygen being weak. According to Lagerhjelm this oxide consists of 100 parts of Bismuth and 11·275 of oxygen; or, according to Mr. Phillips, of Bismuth 90 and oxygen 10 in 100 parts.[2] Bismuth is sometimes mixed with arsenic, which may be separated by treating the Bismuth with nitric acid. By this means the arsenic is transformed into arsenic acid, which uniting with some of the oxide of Bismuth forms an arseniate which is insoluble.

Bismuth inflames in chlorine gas, and forms a chloride. It also combines readily with iodine when heated, and forms an iodide of an orange yellow colour, and soluble in pure potassa. Bismuth does not combine with azote, hydrogen, carbon, boron, silicon, nor phosphorus. Bismuth in fusion readily combines with sulphur, and forms a sulphuret of a bluish grey colour, which is not unlike sulphuret of antimony. It crystallizes in tetrahedral crystals, that cross one another; and is very brittle and fusible. Its constituents, according to

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[1] The Greeks and Arabians were not aware of the existence of Bismuth; but it was very early distinguished by the Germans. It is mentioned as a peculiar metal by Agricola, in his treatise entitled *Bermannus*, written in 1529.

[2] *Translation of the London Pharmacopœia*, 1824, p. 91.

Dr. John Davy, are 100 of Bismuth and 22·34 of sulphur, which nearly agrees with the analysis of Lagerhjelm, who makes them to be 100 of Bismuth and 22·52 of sulphur.[1] Bismuth is readily alloyed with other metals, forming with several of them compound metals of great fusibility.[2] It is dissolved by nitric acid, and by boiling sulphuric acid. The equivalent of Bismuth is 71.

Bismuth, in its metallic state, has no action on the animal economy. It is used merely for preparing the *trisnitrate;* a salt which has long been employed, with great advantage, in cardialgia and similar affections of the stomach.

Officinal preparation. —*Bismuthi Trisnitras,* L. *Bismuthi Subnitras,* D.

BITUMEN.

Syn. Bitume (*F.*), Erdharze (*G.*), Bitume (*I.*), Bitumen (*S.*).

In the limited signification of this term, it is meant to imply those mineral inflammable bodies which resemble, in a certain degree, oily and resinous substances. They have been divided into two classes: the first containing bitumens, or, properly speaking, *bituminous oils,* which possess nearly the same properties as the essential oils; the second, *bitumens,* strictly so called, which possess properties peculiar to themselves[3]; and a third class may be formed of those substances in which bitumen predominates with other components.

A. Bituminous oils:

fluid.	*Sp.* 1. Petroleum.	Var. *a. Naphtha.* *b. Petroleum.*
solid.	2. Maltha, or Sea wax.	
	3. Mineral tallow.	

B. Proper bitumens:

solid.	1. Asphaltum.
semifluid.	2. Mineral tar, or Tallow.
solid.	3. Mineral Caoutchouc.

C. Bituminous compounds:

1. *with resinous matter.*	*Sp.* 1. Resin-asphaltum.
2. *with charcoal.*	2. Pit-coal. Var. *a. Brown coal.* *b. Black coal.* *c. Glance coal.*

According to Hatchett, the elements of bitumens are carbon, hydrogen, sometimes azote, and probably oxygen.[4]

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1 *Thomson's Chymistry,* 5th edit. vol. i. p. 459.

2 An alloy composed of 8 parts of Bismuth, 5 of lead, and 3 of tin, will melt in water below the temperature of 212°; and is rather useful for taking casts and similar purposes.

3 *Thomson's Chymistry,* 5th edit. vol. ii. p. 384.

4 *Linn. Trans.* iv. 129.

Officinal. PETROLEUM BARBADENSE, *Lond.* BITUMEN PETROLEUM, *Edin.* PETROLEUM BARBADENSE, *Dub.* Petroleum. Barbadoes Tar.

Syn. Petrole (*F.*), Steinöhl (*G.*), Bergolja (*Swed.*), Petrolio (*I.*), Neft(*Arab.*), Mitti tel (*H.*), Munty lun (*Tam.*), Minnia tanna (*Malay*), Ippoo (*Sumatran*), Kesosonoabra (*Japanese*).

The officinal names imposed by the three British colleges are not to be regarded as synonymous of the same species of bitumen. The first species of the bituminous oil is properly named by the London College, the second variety of that species being the real Petroleum of the shops; but the Dublin College has incorrectly given the second species of the proper bitumens as the synonyme of Bitumen Petroleum.

Bitumen is found in many parts of the world, in various states of purity. When free from foreign ingredients, and before it has been long exposed to the action of the air, it is named *naphtha;* of which the purest kind that is brought to Europe comes from Monte Ciaro, near Piacenza, in Italy. "This hill consists of horizontal beds of argillite, in which pits are sunk till the water comes in; after which the naphtha oozes out of the sides and floats on the surface of the water, whence it is skimmed off every week."[1] It usually flows from rocks of the coal formation.[2] There is also a fountain of very pure naphtha at the base of the mountains of Bucktiavi, between the city of Bruster and the valley of Ramhovmouz. The less pure petroleum of the shops is procured from Monte Festino, near Modena. In the Birman empire there are 520 wells in one district, which yield annually more than 400,000 hogsheads of petroleum.

Qualities. — Naphtha is colourless, or of a pale yellowish colour, thin, fluid, light, transparent, odoriferous, unctuous to the touch, volatile, and very inflammable: it consists of 36·72 carbon, and 5·00 hydrogen. By long exposure to the air it passes into the second variety, *petroleum;* which is thicker than naphtha, unctuous to the feel, semi-transparent, of a reddish or blackish brown colour, and when long exposed to the air changes into true *bitumen.* It has a strong, penetrating, not disagreeable odour, and a bitter, pungent, acrid taste; and is not quite so inflammable as naphtha. The sp. gr. of naphtha is 0·753 to 0·847: that of petroleum varies from 0·730 to 0·878.[3] Both are insoluble in water; but soluble in alcohol, ether, the volatile and the fixed oils. When distilled with water, petroleum comes over nearly as

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[1] *Mem. Sci.* 1736, p. 57.; quoted by Aikin, *Dict. of Chym.* art. *Bitumen.*

[2] In Zante there are several pitch springs, which were as productive 2300 years ago as they are now.

[3] *Kirwan.*

clear and fluid as naphtha. Both these varieties of bitumens combine with fat, resins, essential oil, and camphor: with alkalies they form soapy compounds; and sulphuric and nitric acids change them into solid resins.

Medical properties and uses. — Petroleum is a stimulating antispasmodic and sudorific; and as such has been given in asthma and coughs unattended with inflammation; and in Germany has been extolled as a specific for tape-worm; but it is chiefly used externally as a stimulant in diseases of the hip-joint, in rheumatic and other chronic pains, in chilblains, porrigo, and to paralytic limbs, applied by friction.[1] It is, however, scarcely ever employed; and on this account is not often to be procured in the shops. The dose of petroleum may be from ♏ x. to f ʒ ss. given in any convenient vehicle.

BOLETUS.

Cl. 24., *Ord.* 13. Cryptogamia Fungi. *Nat. ord.* Fungaceæ.
G. Fungus horizontal, porous beneath.
* *Parasitic, Stemless.*
Spec. 3. B. *Ignarius.* Agaric of the Oak. *Sowerb. Fung. t.* 34.
Officinal. BOLETUS IGNARIUS. AGARICUS, *Edin.* Agaric.

Syn. Agaric de chêne (*F.*), Feuerschwamm (*G.*), Tontcligezwam (*Dutch*), Tyndersvamp (*Dan.*), Froiske (*Swed.*), Gubka (*Polish*), Esca o fungo preparata (*I.*), Agarico (*S.*), Boleto da isca (*Portug.*), Garikoon (*Arab.* and *Tam.*).

This species of fungus is found in Britain, growing upon decayed trunks of the ash and the oak. The pileus, or hat, is scaly and convex, but depressed in the centre. When young it is of a light brown colour above, and soft like velvet, white underneath, and covered with a slimy matter; but when mature it changes to dark brown, approaching to black. It is from six to ten inches in diameter; and although generally stemless, yet it is sometimes supported on a foot-stalk an inch in length.[2]

The Boletus which grows upon the oak is said to be the most valuable. It should be gathered in August or September, and be kept in a dry room. "The way of preparing it is to take off with a knife the white and hard part, till you find a substance so soft as to yield under the finger like shammy leather."[3] This must be divided into different pieces, and these beaten with a hammer till they become so soft as to be torn with the finger.

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[1] In the West Indies the Barbadoes tar is used as an internal remedy. Of the Burmese Petroleum, Dr. Fleming remarks, "In chronic rheumatism I found much greater benefit from it than from the more costly Cajeput oil."—*Asiatic Researches.*

[2] Withering, *Bot. Arrange.* ii. 767.

[3] *Phil. Trans.* xlix. Part 1. 29.

Qualities. — Prepared agaric is inodorous, and has a slightly astringent taste. According to Bouillon la Grange, by whom it has been chemically examined, it contains resin, extractive, something similar to animal gelantine, and different salts.

Medical properties and uses. — Agaric has been much celebrated as a styptic, when externally applied to bleeding arteries and veins. It was introduced by Brossard, a French surgeon, in 1750, and was for some years used both on the Continent and in this country; but if it really possess styptic powers greater than those of lint or sponge, which does not appear to be the case, the improved practice of surgery renders all such applications less necessary than they were when the use of agaric was introduced.

BOSWELLIA. *Roxburgh.*

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Burseraceæ.

Gen. Char. *Cal.* beneath, five-toothed. *Cor.* five petals. *Nect.* a crenulated fleshy cup, surrounding the lower part of the germ, with stamens inserted on its outside. *Capsule* three-sided, three-valved, three-celled. *Seeds* solitary, membranous, winged.

Species. — B. *serrata.* *Asiatic Researches,* 8vo. vol. ix. p. 377.

Officinal. OLIBANUM[1], *Lond. Dub.* JUNIPERI LYCIÆ GUMMI-RESINA, *Edin.* Olibanum.

Syn. Encens (*F.*), Weirauch (*G.*), Olibano (*I.*), Paringhi Sambrani (*Tam.*), Looban (*Malay*), Koondir Zuckir (*Hind.*), Cundur (*Arab.*), Labúniyá (*Syr.*).

Olibanum was supposed, on the authority of Linnæus, to be the production of the Juniperus *Lycia*[2]; but this opinion appears to be erroneous: for, as Mr. Colebrook has observed, "this species of juniper is a native of the south of France;" and the French botanists deny that it yields the resinous gum in question.[3] On this account, therefore, and influenced by other proofs brought forward by Mr. Colebrook, we have been induced to regard olibanum, at least that brought from India, as the production of the Boswellia *serrata* of Roxburgh, although it is still referred to the juniperus *Lycia* in the British Pharmacopœias.[4] Lamarck supposes that the Arabian olibanum is the production of the Amyris *Gileadensis;* but his reasons are not very conclusive.

The Boswellia serrata is a native of the mountains of India, and is vulgarly known under the name of Sálaï. It is a large tree, with the foliage crowded at the extremities of the branches.

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1 Quasi Oleum Libani. Colebrooke, *Asiastic Researches,* 8vo. vol. ix. p. 382.

2 Λιβανος Dioscoridis.

3 *Asiatic Resesarches,* vol. ix. p. 377.

4 Although so much used in the early ages as incense in sacrifices, and, latterly, in the ceremonies of the Greek and Roman churches, yet both ancient and modern writers have differed regarding the plant yielding it.

The leaves are impari-pinnate, consisting of ten pairs of leaflets, sessile, each an inch or an inch and a half in length, obliquely ovate, oblong, obtuse, serrate, and villous, supported by round downy petioles. The flowers, which are produced in axillary racemes, shorter than the leaves, are numerous, small, and of a pale pink colour, accompanied with minute bracteas. The calyx is monophyllous, five-toothed, and downy: the corolla composed of five oblong, spreading, exteriorly downy petals; and the nectary a fleshy, crenulate, coloured cup, adhering to the caylx. The stamens are ten, alternately shorter, supporting oblong anthers: the pistillum consisting of an ovate germen, a cylindrical style, and trilobate stigma. The capsule is smooth, three-sided, trilocular, three-celled, and three-valved: each cell containing one perfect seed only, which is broad, cordate, and winged.

Olibanum is imported in chests and casks from the Levant, and is also sold at the East India Company's sales; but the Indian olibanum is not much esteemed.

Qualities. — Olibanum is a translucent, whitish yellow, brittle substance, generally covered with whitish powder, produced by the friction of the pieces against each other. Its odour, when burnt, is fragrant; its taste is acrid, bitterish, and somewhat aromatic. When heated, although it melts with difficulty, yet it burns brilliantly, and leaves a whitish ash, composed of phosphate, carbonate, and sulphate of lime, with muriate and carbonate of potassa. When distilled alone, it affords a volatile oil; but when in conjunction with water or alcohol, no oil comes over. Alcohol dissolves three fourths of it, forming a transparent solution; and when triturated with water, a milky solution is produced, from which the resinous matter is deposited after some time, and three eighths only remain dissolved. Ether takes up rather more than one half, and when evaporated on water leaves a very pure transparent resin; while the part undissolved by it becomes white and opaque, and is almost entirely soluble in water, forming a milky solution. Hence, olibanum appears to consist of resin, gum, and a volatile oil. This opinion has been lately confirmed by Braconnot, who has analysed olibanum, and found in 100 parts of it, 8 of fragrant volatile oil, 56 of resin, 30 of gum, and 5·2 of a matter resembling gum, but insoluble in water and alcohol. The oil resembled the oil of lemons in odour and colour.

Medical properties and uses. — Olibanum is stimulant and diaphoretic. It was formerly much used in gleets and affections of the chest, and, externally, as a vulnerary; but it is now employed only as a perfume in sick rooms.

BROMINUM.[1] *Lond.*

This substance exists in sea water in the form of bromide of sodium or of magnesium; and may be obtained from the bittern remaining after the chloride of sodium has been separated. It usually exists, also, in brine springs, although that of Droitwich is said to contain none of it. It has likewise been procured from kelp; and Balard has detected it in the ashes of the Janthina Violacea, a molluscous animal. Bromine is extracted from bittern by adding chlorine to it and distilling. Red vapours of bromine rise and are condensed in a receiver kept cool with ice; but Balard's method is to transmit a stream of chlorine through the bittern, and then to agitate the liquid with ether: this dissolves the whole of the bromine, and it is separated with the ether, which rises to the surface of the solution. The etherial tincture is next to be agitated with pure potassa, which forms a bromide of potassium, which being decomposed by chlorine, the bromine is separated by heat. Balard found that sea water contains 3½ per cent. of bromine.

Bromine is a dark reddish brown, very volatile liquid, with a disagreeable, suffocating odour, somewhat resembling chlorine, and a hot acrid taste, and having a sp. gr. 3. It emits reddish vapours, boils at 116·3, and at —4° became solid and brittle. Water dissolves it sparingly; alcohol and ether abundantly: it corrodes organic substances, and is fatal to animal life. In its chemical properties it closely resembles chlorine; with hydrogen and with oxygen it forms acids. Its affinity for the metals is great; some, as antimony, burning spontaneously in it; but it acts feebly on metallic oxides. Its equivalent is 78·4.[2]

Medical properties and uses.—Bromine operates as a violent poison; yet in combination with iron and potassium it has been found useful in the same cases as the iodides of these metals.

Officinal preparations. *Potassii Bromidum*, L.

CAJUPUTI OLEUM. Vide *Melaleuca minor.*

CALAMI RADIX. Vide *Acorus Calamus.*

CALAMINA. Calamine. Vide *Zincum.*

CALUMBÆ RADIX. Vide *Coculus.*

CALX. *Lond. Edin. Dub.* Lime, CALCIS HYDRAS, *Lond.* Slacked Lime.

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[1] From Βρωμος, significant of its rank odour.
[2] Berzelius.

Syn. Chaux (*F.*), Kalk (*G.*), Calce (*I.*). Calviva (*S.*), Chunāmboo (*Tam.*), Hoonoo (*Cyng.*), Soonum (*Tel.*), Capoor (*Malay*), Nooreh (*Pers.*), Chunna (*H.*), Ahúck (*A.*), Kakote-tung-ŏ-ă (*Esquimaux*).

This earth is very rarely found in an uncombined state[1]; but very abundantly in combination with other substances. It forms a part of the bodies of animals and of vegetables; exists in the waters of most rivers, and of the ocean; and is a principal constituent of many fossils, soils, and mountains. The following species only of the fossils in which it is found in combination with carbonic acid require to be noticed: —

Sp. 1. *Chalk.*
2. *Limestone.* Subsp. 1. *Compact Limestone.* *Var. a.* Common. *b.* Roe-stone.
3. *Foliated limestone.* *Var. a.* Granular foliated, or statuary marble. *b.* Calcareous spar.
4. *Fibrous limestone.* *Var. a.* Common fibrous, or satin spar. *b.* Calcsinter, or Stalactite.
5. *Pea stone.*

By exposing any of these carbonates to a strong heat the carbonic acid is driven off, and lime, or quicklime, as it is commonly called, is obtained; not, however, perfectly pure, but containing generally portions of silex, argil, or magnesia. To obtain very pure lime, let white marble be dissolved in dilute muriatic acid, leaving an excess of marble undissolved. A solution of pure ammonia being added to the solution of marble will indicate by a precipitate the presence of argil and magnesia, which are to be separated by filtration; and the lime itself precipitated in the form of carbonate by a solution of pure sub-carbonate of potassa. This precipitate, after it is washed with water and dried, and exposed to a very violent heat in a platinum crucible, is pure lime.[2] It is a white, sonorous, brittle substance, of a sp. gr. 2·3; it is a compound of 1 equivalent of a peculiar metallic base, named *calcium* by Sir H. Davy, and 1 equivalent of oxygen, making the equivalent of lime 28·5. When lime is mixed with a small portion of water, much caloric is evolved, and the water unites with the lime, forming a *hydrate*, or slacked lime. It contains 1 eq. of lime and 1 of water; thence the equivalent of the hydrate is 37·5. The calcareous fossils which are medicinally used are,

1. CHALK. *Friable Carbonate of Lime.*

Officinal. CRETA, *Lond.* CRETA ALBA, *Dub.* CARBONAS CALCIS, *a.* MOLLIOR, *Creta alba*, *Edin.* Chalk.

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[1] Monnet affirms that its exists in the mountains of Upper Auvergne, mixed, however, with a little oxide of iron. *Monnet's Mineralogy*, 515.

[2] Chenevix, *Memoirs of the Irish Academy*, 1802.

Syn. Craie Blanche (*F.*), Kreide (*G.*), Wite kryt (*Dutch*), Kride (*Danish*), Kalabastrace (*Swed.*), Mjel (*Russian*), Gasso (*I.*), Greda (*S.* and *Port.*), Khurree muttie (*H.*), Kilo (*A.*), Simic Chunamboo (*Tam.*), Gal sifid (*Pers.*), Capoor-engrees (*Malay*).

This mineral is found in the north of France, Poland, some of the Danish islands, and in great abundance in the south of England, within a range which commences at Flamborough Head in Yorkshire, and is continued, with irregular interruptions, in Lincolnshire, Suffolk, Surrey, Sussex, Hampshire, and into Dorsetshire. It occurs massive in beds; and contains numerous relics of land and marine animals.

Qualities. — Chalk is inodorous and insipid; but adheres slightly to the tongue. Its colour is either white, or yellowish, or greyish white. It feels meagre and rough; is not very hard, but is pulverulent; breaks with an earthy fracture; stains the fingers, and marks: its hardness, lustre, and transparency, however, are various. Its specific gravity is from 2·315 to 2·78. It is scarcely soluble in pure water, but is dissolved by water containing carbonic acid in excess. It effervesces with acids; and generally contains a small portion of alumina. The average proportion of lime is 53 per cent. The equivalent of the carbonate is 50·5.

Medical properties and uses. — Chalk is antacid; but it must undergo levigation and washing, before it can be internally administered. In powder it is advantageously employed as an absorbent in burns and excoriations.

Officinal preparations.—*Creta preparata*, L. E. D. *Subcarbonas ammonia*, L.

LIMESTONE. *Hard Carbonate of Lime.*

Officinal. MARMOR *Lond.* MARMOR ALBUM, *Dub.* CARBONAS CALCIS, *b.* DURIOR, *Marmor album*, *Edin.* Limestone. White Marble.

Syn. Pierre à chaux ; chaux carbonatée (*F.*), Kalkstein (*G.*), Marino ; ossi-carbonato di calce (*I.*), Chunamboo kulloo (*Tam.*), Kakote-tung-ŏ-ă (*Esquimaux*).

Although all the varieties of limestone may be regarded as officinal, yet the two varieties particularly designated are *var. a.* of the first sub-species, *common compact limestone*, and *a.* of the second sub-species, *granular foliated limestone*, or *white Carrara marble.* The first is found abundantly in Britain, in extensive strata connected with floetz and coal formations, the second is brought from Carrara and Paros, and belongs exclusively to the primitive and transitive mountains.

Qualities. — *Common limestone* is inodorous and insipid: of a grey colour, sometimes variegated with veins, stripes, and clouds of yellow, flesh red, and greenish grey. It is hard and brittle; the fracture splintery; the fragments sharp-edged, and scarcely translucent. Its specific gravity is from 2·6 to

2·7. *White Marble* has a granular texture, white colour, and foliated fracture. Its specific gravity is from 2·7 to 2·84. Both varieties dissolve in acids with effervescence; and contain about 65 per cent. of lime.

Use. — Marble and limestone are chiefly used for obtaining pure lime.

CAMBOGIA. Vide *Stalagmites cambogiöides.*

CAMPHORA. Vide *Laurus Camphora.*

CANCER. *Syst. Nat. Gmelin,* 2963.

D. 3. Articulata. *Cl.* 2. *Ord.* 1. Crustacea Decapodia, *Cuvier.*
Feet eight (sometimes six or ten), two of them with claws. *Palpi* six, nearly equal. *Eyes* two, distant, moveable, in many of the species standing on longated peduncles. *Mandible* horny, thick. *Lip* triple. *Tail* jointed and unarmed.
Sp. 27. C. *Pagurus.* Black-clawed Crab. *Brit. Zoology,* iv. 4. *t.* 3.
Sp. 63. C. *Astacus.* The Crawfish. *Brit. Zoology,* iv. 9. *t.* 15. *f.* 27.

1. CANCER PAGURUS.

Officinal. CHELÆ CANCRORUM, *Edin.* Crab's Claws.

Syn. Patte d'Ecrevisse (*F.*), Klauaan Krabbe (*G.*), Forbici di Granchi (*I.*), Pierna de Cangrejos (*S.*), Kreeftschaaren (*Dutch*), Kräftkler (*Swed.*).

The black-clawed crab frequents the rocky coasts of the North Sea and the British isles; and is considered delicious food. The thorax is obtusely scalloped; the body smooth; and the front five-toothed. The hind feet are subulate; but the fore are furnished with large claws tipped with black. It annually casts its shell, between Christmas and Easter.

Mr. Hatchett found that the crustaceous covering of crabs and lobsters consists of carbonate of lime, phosphate of lime, and a cartilaginous matter, possessing the properties of coagulated albumen. The first of these constituents predominates[1]; and it is on it that the medical properties of the claws depend. They are now deservedly rejected by every judicious practitioner, chalk answering, much better, every purpose for which they can be prescribed.

2. CANCER ASTACUS.

Officinal. LAPILLI CANCRORUM, *Edin.* Crabstones.

Syn. Yeux d'Ecrevisse (*F.*), Krabsangen Krebssteine (*G.*), Kraftsteene (*Dutch*), Krafstenar (*Swed.*), Ojos de Cangrejos (*S.*).

The crawfish frequents rivers, forming its holes in their clayey banks. It is small, and in some degree resembles the lobster in shape. The snout is projecting and serrated on

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[1] Constituents of the shell: chloride of sodium 1·60 + phosphate of lime 6 + phosphate of magnesia 1 + carbonate of lime 62·80 + animal matter 28·60 = 100·00.

the sides; the thorax is smooth; as is also the back, which has two small spines on each side. The large claws are beset with small tubercles: the two first pairs of legs are clawed, the two next subulated; and the tail has five joints, with rounded fins.

The concretions, called eyes, are found in the stomach, one on each side, before the fish casts its shell in July, at which time the inner coat of the stomach also is renewed. They are said to be destined for assisting in the formation of the new shell. At Astracan, where the greatest number of these concretions are procured, the crawfish are bruised with mallets, and allowed to putrefy in heaps, after which their remains are washed, and the stones picked out.

Qualities.—Crabstones are whitish or reddish, hard and stony, of very different sizes, weighing from one grain to twelve grains each; round and convex on one side, and a little concave on the other: the texture is laminated; inodorous and insipid. Their constituents are the same as those of the crab's claws. They effervesce in acids; but, instead of dissolving altogether, they become soft, transparent, and retain their original form; by which means the real stones are easily distinguished from counterfeited imitations.

Medical properties and uses. — These concretions are absorbent and slightly antacid; and when prepared by trituration and levigation, are employed in dyspepsia and other diseases attended with acidity of the *primæ viæ;* but as chalk answers better in these cases, they may well be dispensed with.

The dose is ʒ j. or ʒ ij. suspended in a proper fluid.

Officinal preparation.—*Cancrorum Lapilli præparati,* E.

CANELLA. *Spec. Plant. Willd.* ii. 857.

Cl. 11. *Ord.* 1. Dodecandria Monogynia. *Nat. Ord.* Meliaceæ.

G. 942. *Cal.* Three-lobed. *Pet.* five. *Anthers,* 16, adhering to a pitcher-shaped nectary. *Berry* one-celled, with two or four seeds.

Species 1. C. *alba.*[1] White or Laurel-leaved Canella. *Med. Bot. 3d edit.* 694. *t.* 237. *Trans. Linn. Soc.* vol. i. 96. *t.* 8.

Officinal. CANELLÆ CORTEX, *Lond.* CANELLÆ ALBÆ, CORTEX, *Edin.* CANELLA ALBA, CORTEX, *Dub.* Canella Bark.

Syn. Cannelle blanche (*F.*), Weisser Zimmet (*G.*), Hwit Kanel (*Swed.*), Cannella bianca (*I.*), Canella blanca (*S.*)

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[1] This plant has been often confounded with the *Wintera aromatica,* an error authorized in some degree by Linnæus, who combined the two genera of Winterana and Canella under the name of *Laurus Winterana;* but afterwards made this a distinct genus under the title *Winterana,* a name by which it was known till Professor Murray corrected the error, and made a distinct genus of Canella. Vide *Syst. Veg.* 14th edit. 443. Sir Hans Sloane stated the error of confounding this bark with the Cortex Winteranus, in his description of the tree in the *Phil. Trans.* xvii. 465.

This tree is a native of the West India islands, growing in the inland woods. It rises very straight, from ten to fifty feet in height. The branches are erect, not spreading, and only at the top of the tree; furnished with spatulate leaves, irregularly alternate, oblong, obtuse, entire, nerveless, of a dark green colour, thick and shining like those of the laurel, and emitting a similar odour. The flowers, which exhale a powerful aromatic perfume, are small and of a scarlet colour, seldom opening, and grow in clusters upon divided foot-stalks at the summits of the branches. The calyx is of one piece, small, persistent, and deeply tripartite; the petals are five times as long as the calyx, oblong, sessile, concave, erect, two a little narrower than the others: the nectary is pitcher-shaped, antheriferous, and deciduous. The anthers are twenty-one in number, distinct, fixed longitudinally to the outside of the nectary, and discharge a yellow pollen. The germen is superior, ovate; the style cylindrical, with two rough, convex, blunt stigmas. The fruit is an oblong, one-celled, glossy, blackberry.

The inner bark of the branches is freed from the cuticle, and dried in the shade. It is brought to this country packed in casks and cases, in long pieces, some rolled in quills, and others flat: the quilled sort is considerably thicker than cinnamon, and the flat nearly one fourth of an inch an thickness.

Qualities. — The quilled pieces of Canella are of a whitish-yellow colour on both sides, and break with a starchy fracture; the flat pieces, which appear to be the bark of the largest branches or of the stem, are yellow on the outside, and pale brown within. The odour of both kinds, when fresh broken, is aromatic, something like a mixture of cloves and cinnamon; and the taste slightly bitter, extremely warm and pungent. Although boiling water takes up nearly one fourth of the weight of the bark, yet the infusion possesses but little of its warmth and pungency; the bitter chiefly predominating. Alcohol extracts all its qualities in perfection: the tincture is bright yellow, and becomes milky on the addition of water. The infusion is not altered by infusion of galls; sulphate of iron, zinc, bichloride of mercury, nor tartarized antimony; but nitrate of silver and acetate of lead render it milky, and throw down precipitates. By distillation with water, Canella alba affords a thick, heavy, yellow, very pungent, gratefully odorous volatile oil; on which, and a little bitter resinous matter its virtues seem to depend. It contains also starch, albumen, some acetate, muriate, and oxalate of lime.

Medical properties and uses. — This bark is stimulant, and slightly tonic. It is a useful adjunct to bitters in some cases of dyspepsia and atonic gout; but it is employed chiefly on account of its flavour, and to correct the griping quality of the resinous cathartics. It is said to prove useful in scurvy.[1]

The dose of the powdered bark is from grs. x. to ʒ ss.

Officinal preparations. — *Tinctura Gentianæ composita,* E. D. *Vinum Aloes,* L. E. D. *Pulvis Aloes cum canella,* D.

CANTHARIS.

D. 3. Articulata. *Cl.* 4. Insecta. *Ord.* 5. Coleoptera. *Cuvier.*

Feelers filiform. *Palpi* four, unequal: the posterior ones clubbed. *Thorax* nearly round. *Head* inflected, gibbous. *Elytra* soft, flexible.

Species 1. Cantharis *vesicatoria.* Blistering Fly. *Latreille,* tom. ii. p. 220. *Lamarck. Hist. Nat. des Animaux sans Vertèbres.*

Officinal. CANTHARIS, *Lond.* CANTHARIS VESICATORIA, *Edin. Dub.* Blistering or Spanish Fly. Cantharides.

Syn. Cantharides (*F.*), Spanische Fliegenoder Kanthariden (*G.*), Spaansche Vliegen (*Dutch*), Spanca (*Swed.*), Machy Hisapanskie (*Pol.*), Cantarelle (*I.*) Cantharidas (*S.*).

This insect is found on the privet, ash, elder, lilac, white poplar, and the tartarian honeysuckle, in Spain, Italy, France, and to a certain extent over the greater part of Europe. It is two thirds of an inch in length, and one fourth of an inch in breadth, oblong, and of a green, gold-shining colour; with long, flexible elytra or wing sheaths, marked with three longitudinal raised stripes, and covering brown, membranous, transparent wings. The body is terminated by two small, callous, sharp spines, and on the head are two black, jointed feelers. The mandibles are strong, equal, and terminate in a point: there are no teeth. The jaws are partly bony, partly membranous; lobated. The corslet is small, square, and less than the abdomen. The feet are furnished with filiform tarsi, and terminated by a double pair of long, curved, horny hooks. The larva of the Cantharis live in the ground. When alive Cantharides have a fœtid odour.[2] They are gathered by smoking with brimstone the trees on which they are found, and catching them on a cloth spread underneath. They are sometimes simply shaken from the trees, and then killed by the steams of boiling vinegar, and dried either by the sun or in a stove.

Blistering flies are imported from Sicily, but chiefly from Astracan, packed in casks and small chests. The best are of

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[1] This bark and the fruit of the capsicum were formerly common ingredients in the food and drink of the Caraibs, the ancient inhabitants of the Antilles; and at present enter the meagre pot of the negroes. — *Linn. Trans.* l. c.

[2] It is ascertained that a person who sits under a tree on which many of these insects are, particularly at the time of copulation, experiences ardor urinæ, pain of the bladder, and sometimes ophthalmia.

a lively, fresh colour, a small size, and not mouldy, nor mixed with the Melolontha *vitis*, an insect resembling them in some degree, but possessing no vesicating property. It may be distinguished by its form, which is altogether more square than that of the Cantharis, and by its black feet.[1] If the blistering flies have been properly dried, and are kept in a well-stopped glass bottle, they will remain unchanged in appearance, and retain their acrimony for a great length of time[2]; but sometimes, in spite of every precaution, they are attacked by a small worm, which, however, feeds on the soft parts only of the fly, reducing it to a powder that still possesses the active quality of the entire insect. They soon putrefy when kept in a damp place, and therefore should be occasionally spread out to the air. In the East Indies, the Meloè *trianthema* is used; and in China, the Mylabris *variabilis*, which has lately been employed to a limited extent in this country.

Qualities. — Blistering flies have a heavy disagreeable odour, and an acrid taste. Lewis found that their active constituents are soluble both in water and in alcohol, and that the residuum is inert. Thouvenel, Beaupoil, and Robiquet have analyzed the insect.

Thouvenel treated the entire flies with *water*, *alcohol*, and *ether*, separately, submitting them to the press; and obtained the following results: 1st, Three eighths of reddish yellow, very bitter, extractive, affording by distillation an acid liquor: 2d, One tenth of concrete, waxy, green oil, having the odour of the flies, and yielding by distillation a very sharp acid and a thick oil: 3d, One fiftieth of concrete, yellow oil, apparently the colouring matter of the insect; and, 4th, One half of solid parenchymatous matter. He imagined that the blistering principle resides in the green waxy oil; and that the strangury produced by blisters is the effect of the acid obtained from this oil by distillation.[3]

Beaupoil found that an aqueous infusion of the flies, when exposed to the air, lets fall a yellow precipitate, exhales an ammoniacal odour, and reddens tincture of turnsole: the addition of ether or alcohol divides it into two parts; viz. a black gluey matter, insoluble in alcohol, and a yellowish-brown, very soluble matter.[4] The black matter blistered the skin without

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1 Fabricius thus describes the Melolontha: "*Maxilla* brevis cornea; apice multidentata. *Antennæ* lamellatæ. Melolontha *vitis*. Viridis, thoracis lateribus flavis, pedes nigri." Vide *Rœmer, Gen. Insect.* t. 1. fig. 11.

2 Van Swieten kept them upwards of 30 years in a glass vessel not particularly well corked, and they still produced vesication.

3 *Annales de Chymie*, xlvii. 280.

4 From one ounce of cantharides he obtained, of black matter, 2 gros. 2 grs.;

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affecting the urinary organs; the yellow matter did not blister when applied alone, but blistered quickly when united with wax; and a green matter, which he also obtained, acted under similar circumstances, but less actively.

Robiquet asserts, that the flies, when recently collected, yield some uric acid. By treating them with water, alcohol, and ether, he obtained a peculiar matter in the form of small, crystalline, micaceous plates, insoluble in water and in cold alcohol, but soluble in boiling alcohol, in ether, and in oils; on the presence of which the vesicating property of the flies depends, and which, in combination with oil, might supersede their use. Dr. Thomson[1] has named it, *Cantharidin.*[2] Orfila has found that by distillation a volatile principle is procured, on which the fœtid odour of the beetle depends.

Medical properties and uses. — Blistering flies, internally exhibited, are powerfully stimulant and diuretic; and, externally applied, rubefacient and epispastic. Notwithstanding their acrimony, they appear to have been given as an internal remedy by Hippocrates, who prescribed them chiefly in cases of dropsy and amenorrhœa.[3] They have a considerable effect on the urinary organs, even when externally applied; and unless the dose be moderate, and their internal exhibition be conducted with great caution, they act with so much violence on the kidneys, bladder, and small intestines, as to produce bloody urine, purulent stools, insupportable pains of the abdomen, vomiting, and other symptoms of intestinal inflammation; convulsions, delirium, syncope, and death. They have, however, been successfully employed in dropsy, obstinate gleet[4],

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yellow matter, 1—2; green matter, 1—8; parenchyma, 4—36; phosphate of lime, 12 grains; carbonate of lime, 2 grains; sulphate and muriate of lime, 4 grains; oxide of iron, 2 grains; and an acid, the quantity of which was not ascertained. *Annales de Chymie*, xlviii. 33.

[1] Vide *System of Chemistry*, 5th edit. iv. p. 436.; and *Ann. de Chym.* lxxvi. p. 308. Thierry's method of procuring the principle is to macerate the bruised beetle in ether for several days, in an apparatus for filtering by displacement; adding, after the liquid ceases to flow out, fresh portions of ether, till the soluble matter is exhausted. Then pour water on the mass to displace the ether. The etherial tincture is next to be distilled, and the deposit from the residue, when cold, is to be treated with boiling alcohol and animal charcoal. The cantharidin is thus obtained pure in crystals: 1,000 parts of cantharides yield four parts of pure cantharidin.

[2] Dioscorides and Galen imagined that the active principle of the fly was contained in its body, and that the head, wings, and feet contained its antidote.

[3] Dr. Groenvelt was prosecuted for using them internally, and published his tract, "*De tuto Cantharidum usu interno,*" as his vindication; but although it proved to his prosecutors the safety of his practice, yet (says *Quincy, Pharm.* p. 152.) it ruined the unhappy doctor.

[4] Probably gleets were included in the term gonorrhœa by the old writers, who frequently mention cantharides as a remedy for gonorrhœa. Thus Boccone (*Museo di Fisica*, 1699,) says, they were much used by the Sicilians in gonorrhœa.

leucorrhœa, and incontinence of urine arising from paralysis of the sphincter vesicæ. The free use of diluents, as milk, almond emulsion, and mucilaginous solutions, is absolutely necessary during their employment to moderate their action. The tincture is the most proper form for internal use; or, if given in substance, the dose should not exceed one grain of the powdered flies, formed into a pill with opium or extract of henbane. They require to be used for a considerable length of time, in order to prove beneficial.

Blistering flies, when applied to the skin, act as a local stimulant, first reddening and inflaming the part, and then producing from the exhalents a copious discharge of serum under the cuticle. These effects they produce more certainly and completely than any vegetable acrid, and therefore they may be employed either as rubefacients or to raise blisters.

It is uncertain whether blisters were used by the ancients; but modern practitioners daily and successfully employ them. Although their first operation is local, yet, under certain circumstances, the stimulus is sufficient to rouse the whole nervous energy, and excite the general system, so as to render their application useful in diseases of diminished excitement; on which account, in deep-seated local affections, when the inflammatory diathesis is considerable, the force of the circulation must be diminished by bleeding, purging, or other evacuants, before blisters can be advantageously applied. The diseases of debility in which they are useful, are low nervous fever, when accompanied with delirium, pale urine, frequent sighing, great anxiety, deafness, a fixed stare and glistening eyes. In palsy, and gutta serena, they are applied to the forehead over the supra-orbital nerve. They are found efficacious also in spasmodic and convulsive affections, from the irritation they produce overcoming the morbid irritation which induced the spasm. Blisters, by their local action, relieve internal inflammatory diseases, by altering the balance of the circulation; partly, also, by diverting the attention from the prior seat of pain, contrary to the opinions of the ancient physicians, who attributed much of their efficacy to the serous effusion which they induce. Hence, their utility in ophthalmia, applied behind the ears, on the temples, or the forehead; in phrenitis, over the head; in cynanche tonsillaris, and in small-pox, when the swelling of the fauces affects respiration, upon or near the neck; and in phthisis, catarrh, hepatitis, pneumonia, gastritis, and other intestinal inflammations, immediately over the seat of pain. In acute rheumatism, particularly that variety of it named sciatica, they have been found very useful. On the same principle, caries in the bones and joints, or a disposition to it, is often cured by the repeated application of blisters. "Under their application the enlargements obviously subside; the crepitation between the bones, the consequence of the abrasion of the cartilages, ceases to be felt when the blister begins to operate, the use of the joint is effectually recovered, and anchylosis prevented."[1] A succession of blisters, also, to the vicinity of an inflamed organ, is more beneficial than a protracted discharge from one; and a second blister often relieves after the first has failed. Blisters are contra-indicated in diseases of great debility, where there is a tendency to mortification; as in the low stages of petechial fevers, cynanche maligna, confluent small-pox, and malignant measles; and in dropsy, in which they are apt to occasion a very painful, dangerous erysipelas, and gangrene. Peculiar idiosyncrasies forbid their use in some persons, as they irritate, heat, produce thirst, pain, tremors, and sometimes convulsions. In those of irritable temperament, their application is often attended with strangury and bloody urine; and this effect is much increased, if the blister-plaster be applied over a newly-shaved part, or if it be allowed to remain too long on after the blister has risen. To prevent strangury from the application of blisters, camphor has been erroneously regarded as a specific. It is more effectually prevented and relieved by copious dilution with milk, and mucilaginous fluids, by fomentations of warm milk and water to the blistered part after the removal of the plaster, by the introduction of an opium suppository into the rectum; and by interposing between the vesicatory and the skin a piece of gauze, wetted with vinegar, and applied smooth and close over the plaster[2]; or a piece of silver paper moistened with oil.

The internal dose of cantharides is from gr. j. to grs. iij.

Officinal preparations.— *Tinctura Cantharidis*, L. D. *Emplastrum Cantharidis*, L. D. *Emplastrum Cantharidis vesicatoriæ*, E. *Ceratum Cantharidis*, L. *Unguentum infusi Cantharidis vesicatoriæ*, E. *Unguentum Cantharidis*, L. *Unguentum Pulveris Cantharidis vesicatoriæ*, E.

CAPSICUM. *Spec. Plant. Willd.* i. 1050.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solaneæ, *Juss.*
G. 334. *Corolla* wheel-shaped. *Berry* without juice.
Sp. 1. C. *annuum.* Annual Capsicum.[3] *Med. Bot. 2d ed.* 226. *t.* 80.

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[1] Ford *On Diseases of the Hip-joint*, 53.

[2] In America, Cantharis *cinerea*, C. *vittata*, C. *marginata*, and C. *atrata* have been used instead of common Cantharides. They raise a blister as speedily, and are said not to occasion strangury.

[3] Sprengel, in his *History of Botany*, under the head "*Plinius*," says, "Capsicum annuum sine dubio est ea Piperitis, quam et Siliquastrum vocat.—(20. 17.)"

Officinal. CAPSICUM, *Lond.* CAPSICI ANNUI FRUCTUS, *Edin.* CAPSICI ANNUI CAPSULÆ CUM SEMINIBUS. *Dub.* Capsicum, or Cayenne Pepper.

Syn. Poivre d'Inde (*F.*), Spanisdier oderturkircher pfeffer (*G.*), Iaarlykse Spaansche peper (*Dutch*), Baclg-peber (*Dan.*), Spansk peppar (*Swed.*), Pieprzyea (*Pol.*), Pepperone (*I.*), Pimienta de Indias (*S.*), Pimentao da India (*Port.*), L'ul Mirch (*H.*), Brāhn Maricha (*San.*), Mollaghai (*Tam.*), Filfil surkh (*Pers.*), Felfel (*Arab.*), Lornbak (*Jav.*), Chabai (*Malay*).

This is an annual plant, a native of both the Indies, and cultivated all over Europe. It flowers in June or July, and the fruit is ripe in October. The stem is herbaceous, roundish, smooth, crooked, branching, and rising two or three feet in height. The leaves are ovate, smooth, entire, placed on long foot-stalks in an irregular order. The flowers are peduncled axillary, solitary, and white: the calyx is persistent, tubular, and divided at the edge into five short segments; the corolla wheel-shaped, five-cleft, the segments pointed and plaited: the filaments are short, tapering with oblong anthers; and the germen is ovate, supporting a slender style, which is longer than the filaments, and terminated by a blunt stigma. The fruit is a long, conical, pendulous, pod-like berry, of a shining, orange-scarlet, or sometimes yellow colour, two-celled, and containing a dry spongy pulp with several flat, kidney-shaped seeds.

Many varieties of this species of Capsicum enter into the composition of Cayenne pepper; but, certainly, the best which is brought home from the West Indies, ready prepared, is made from the Capsicum *baccatum* (Bird pepper), or the Capsicum *frutescens.* Cayenne pepper is often mixed with muriate of soda; and, sometimes, with a less innocent substance, the red oxide of lead. This fraud may be discovered by boiling some of the suspected pepper in vinegar, and, after filtering the decoction, adding to it a solution of sulphuretted hydrogen gas, which will throw down a black precipitate: or sulphate of soda may be used; in which case, if the pepper contain oxide of lead, a white precipitate will be produced, which, after being dried, and exposed to heat mixed with a little charcoal, will afford a globule of lead.

Qualities. — Capsicum berries have a red colour, an aromatic odour, which is somewhat impaired by drying; and an aromatic, extremely pungent, acrimonious taste, setting the mouth, as it were, on fire, and the impression remaining long on the palate. These sensible qualities are imparted to water, alcohol, and ether. Half a drachm of the powder infused in f ℥ jss. of boiling water lost grs. xij. The infusion is precipitated by infusion of galls, and alcohol dissolves the precipitate. It is also precipitated by nitrate of silver, bichloride of mercury, acetate of lead, the sulphates of iron, zinc, and copper, the alkaline carbonates, and alum: but it is not altered by the mineral acids, the solution of potassa, nor by silicized potassa. The ethereal tincture, when evaporated on the surface of water, leaves an orange-coloured resin, in which the pungency of the capsicum is concentrated. These experiments point out the substances which are incompatible in formula with infusions of capsicum; and have led to the conclusion that it contains chiefly cinchonia, resin, vegetable mucus, an acrid principle, in which the acrimony resides, and a fixed oil.[1] Braconnot acted upon the capsicum, freed from seeds, with strong alcohol: on evaporating the tincture, a coloured wax first separated, and, secondly, an extract by evaporating the residuary fluid. On treating this extract with ether he procured a soft reddish-brown oleo-resin, which possesses in an eminent degree the properties of the capsicum: this he calls *Capsicin.* It exists in the proportion of 1·9 per cent. of the pods: it is scarcely soluble in water or in vinegar, but very soluble in ether, alcohol, the volatile oils, and liquor potassæ. Besides this, Braconnot procured pectic acid, an azotized matter, gum, and a colouring matter from capsicum.

Medical properties and uses. — The fruit of the capsicum, or Cayenne pepper, is a powerful stimulant, unaccompanied with any narcotic property. As a condiment it is generally used both in tropical and temperate climates; and it appears to have been used as such by the Romans.[2] It has been successfully given in atonic gout, in dyspepsia, when accompanied with much flatulence; in tympanitis, and paralysis. In dropsies, and other cachectic complaints, when chalybeates are indicated, a small portion of powdered capsicum is recommended as an excellent addition by Dr. Wright; and Bergius says, that he used it with success in obstinate intermittents.[3] I have had sufficient experience of its efficacy as an adjunct to cinchona bark in intermittents; and also in lethargic affections[4]; but the diseases in which capsicum has been found most useful are cynanche maligna, and scarlatina maligna, in which it is administered internally and used as a gargle. Its sensible effects are heat in the stomach, and a general glow over the body, without much acceleration of the

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[1] *Journ. de Phisique,* 1820, p. 173.
[2] Pliny.
[3] *Mat. Med. e Regno Veg.* i. 44.
[4] Dr. Paris says that *Rymer's Cardiac Tincture* is an infusion of capsicum, camphor, cardamom seeds, rhubarb, aloes, and castor, in proof spirit, with a small quantity of sulphuric acid. *Pharmacologia.*

pulse; and, as a gargle, it cleans without impeding the healing of the ulcers of the fauces. Cataplasms of capsicum operate as powerful rubefacients without blistering the skin, and are used in the West Indies to relieve the coma and delirium which, almost constantly, attend tropical fevers. The diluted juice of the fruit is said to be a sovereign remedy in ophthalmia from relaxation. The powder applied to a relaxed uvula is a most useful stimulant.

Capsicum may be given in the form of pills, in doses from grs. v. to grs. x.; or f ʒ ss. to f ʒ ij. of a tincture made with ʒ iv. of *capsicum* and f ℥ viij. of *alcohol.* The gargle usually employed is made by kneading into a paste ʒ j. of *Cayenne pepper* and ℈ j. of *common salt;* then adding f ℥ vj. of boiling water; and to the strained solution, f ʒ iv. of vinegar. But a simple addition of f ʒ iij. of the tincture to f ℥ vj. of water, or of infusion of roses, answers equally well.

Officinal preparations. — *Tinctura Capsici,* L. E. D.

CARBO ANIMALIS. *Lond.*

Most animal substances, when exposed to a high temperature in close vessels, are converted into charcoal; but the animal charcoal inserted in the list of Materia Medica by the London College of Physicians is prepared chiefly from bones, or from ivory. But ivory black, or bone charcoal, requires to be purified by digestion in hydrochloric acid, in order to free it from carbonate and phosphate of lime, and afterwards washing out the muriates until the water passes off free from any saline matters. Pure animal charcoal should not yield bubbles when treated with hydrochloric acid; nor should the acid to which it has been subjected throw down a precipitate with sesquicarbonate of ammonia: the first mode of testing demonstrates the absence of carbonate of lime, the second that of the phosphate.

Uses. — Pure animal charcoal is only employed for the purpose of destroying the colouring matter which adheres to the crystalline products of some vegetable substances. Thus the second crystallization of morphia is dark coloured; but it becomes white when digested with animal charcoal.

Officinal preparations. — *Aconitina,* L. *Morphiæ Hydrochloras,* L. *Quinæ disulphas,* L. *Veratria,* L.

CARBO LIGNI. *Lond. Edin. Dub.*

Syn. Charbon de bois purifié (*F.*), Reine Kohle (*G.*), Koole (*Dutch*), Kol (*Swed.*), Carbone di legna (*I.*), Carbon de lena (*S.*), Adapoo Currie (*Tam.*) Fuhm Chobic (*Arab.*), Zegal Chobic (*Pers.*), Koyla (*H.*), Arang (*Malay*).

Charcoal is prepared for the common purposes of fuel, by piling up billets of wood into conical heaps, which are covered with earth and sods, and then burned, with as little exposure to the action of the air as possible: but for the preparation of the finer kinds of charcoal, fit for medicinal use, the following process is employed. The wood to be charred is put into a large cast-iron cylinder, fixed in masonry over a grate. This cylinder terminates at one end in a curved pipe, and the other end is furnished with a door, which is accurately closed after the wood is introduced: a fire is next lighted in the grate; and the water, empyreumatic acid, and volatile parts of the wood, are driven off through the curved tube by the heat, which is increased until the contents of the cylinder become red-hot. The fire is then withdrawn, the cylinder is allowed to cool; and a black, shining, pure charcoal is thus obtained.[1] Ivory and bone shavings, treated in the same manner, make the preparation termed *Ivory Black*. For internal use, however, it is perhaps necessary to have wood charcoal still purer; and to effect this, the process of M. Lowitz is to be preferred. The charcoal is to be reduced to fine powder, and put into a crucible (so as to fill it), on which a pierced cover must be luted. This vessel is then to be heated red-hot, and kept so, as long as a blue flame appears to issue from the hole in the cover; and when this stops, it is to be taken from the fire, cooled in a dry place, and the charcoal, instantly, put into well-stopped bottles for use.[2]

In whatever manner prepared, the purest charcoal contains, generally, about one fiftieth of its weight of earths, salts, or metallic matters; its other constituents are, according to Doberiener[3], 68·4 of carbon, with 1·5 of hydrogen, and a minute portion of oxygen. The salts and earthy matters can be separated by boiling the charcoal with diluted muriatic acid in excess; then washing the charcoal on a filter with boiling water, until the fluid passes free from acid and throws down no precipitate with oxalate of ammonia. The powder is finally to be dried in a stove.

Qualities. — Pure charcoal is inodorous and insipid; black, shining, and brittle. It is a good conductor of electricity. Its sp. gr. is about 3·5. When newly prepared, it absorbs air, gases, moisture from the atmosphere, and liquids, so as to increase its weight from 10 to 18 per cent., according to the kind of wood from which it is made.[4] It is insoluble in water and every other fluid[5]; and is easily pulverized. When ex-

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[1] This process was invented by Bishop Watson, for the use of the gunpowder manufacturers, who require a very pure charcoal. — *Aikin's Chem. Dict.*, art. *Carbon.*

[2] *Crell's Chymical Journal*, ii. 270.

[3] *Schweizger's Journal*, xvi. p. 92.

[4] From the experiments of Allen and Pepys, charcoal from fir gained 13 per cent.; from box, 14; from beech, 16·3; from oak, 16·5; from mahogany, 18.

[5] There is, nevertheless, a quack preparation for cleaning the teeth, sold under the name of "*Concentrated Solution of Charcoal.*"

cluded from air, it is not affected by the highest degree of heat. When pure and well washed, so as to destroy all the earths and salts, it corrects the fœtid odour of putrefying animal and vegetable substances; and destroys the odour, taste, and colour of some, particularly of mucilages and oil, and matters in which extractive abounds. Thus, common vinegar becomes colourless when it is boiled in pure charcoal powder; water, which has become fœtid at sea, is purified by filtering it through charcoal; that intended for long voyages may be preserved perfectly pure by thoroughly charring the insides of the casks.[1]

Medical properties and uses. — Charcoal is evidently an antiseptic; and, as such, has been given internally to correct the putrid eructations of some kinds of dyspepsia. But, in order that it may produce this effect, it should either be newly prepared, or such as has been preserved in very well-stopped bottles. It is probable that it operates both by correcting the fœtor, and absorbing the gas generated in the stomach, as well as checking the decomposition of the undigested aliment. Dr. Calcagno, an Italian physician, proposed to employ it instead of Cinchona bark in intermittents[2]; but this suggestion has not been supported by British practitioners. It has been applied, advantageously, mixed up in powder with boiled bread, or linseed meal and water, as a poultice, to foul ulcers and gangrenous sores; and it is undoubtedly, in combination with powdered catechu, kino, or rhatany root, the best toothpowder known. I have discovered that it may be used also as a test for arsenic. (See the article *Arsenic.*)

The dose of charcoal may be from grs. x. to ʒj. combined with rhubarb.

Officinal preparations.—*Cataplasma Carbonis ligni*, D. *Barytæ Murias*, E. D.

CARDAMINE. *Spec. Plant. Willd.* iii. 481.

Cl. 15. *Ord.* 2. Tetradynamia Siliquosa. *Nat. ord.* Cruciferæ.

G. 1237. *Pods* opening elastically, with revolute valves. *Stigma* entire. *Calyx* somewhat gaping.

*** *With pinnate leaves.*

Sp. 19. C. *pratensis.*[3] Cuckoo flower. *Med. Bot. 3d ed.* 396. *t.* 133. *Smith's Flora Britan.* ii. 699.

Officinal. CARDAMINE, *Lond.* CARDAMINES FLORES, *Edin. Dub.* The flowers and leaves of Cuckoo Flower.

Syn. Cresson de Prés (*F.*), Wiesenkresse (*G.*), Koekkesbloem (*Dutch*), Kardamine (*Ital.*)

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[1] Wood soot, *Fuligo ligni*, may be regarded as a variety of charcoal.
[2] Vide *London Med. Repos.* vol. iii. p. 7.
[3] Σισυμβρίον ἕτερον Dioscoridis.

Cuckoo flower is a perennial, indigenous, herbaceous plant, which grows in moist meadows, and flowers in April and May. The root is tuberous, and somewhat toothed. The stem rises about nine inches in height, is erect, smooth, stiffish, somewhat angular, and a little branched at the top: the leaves are dark-green, pinnated; the radical ones petiolate and spreading; those of the stem almost sessile; the leaflets are four pair or more, opposite, with a terminal one; on the lower leaves they are roundish, and irregularly dentated; but become more entire, linear, pointed, and concave, the nearer they are to the top of the stem. The flowers terminate the stem in a corymb, and stand upon smooth naked peduncles. The calyx is yellowish green, composed of four concave, oblong, nearly obtuse, deciduous scales, alternately larger, and protuberant at the base; the corolla is cruciform, the petals large, of a very pale purple colour, or white, ovate, veined, and slightly emarginate, with a yellowish green base. The filaments are six: four long, standing above the corolla, and two short, almost hid, supporting small, oblong, yellow anthers; and invested at the base with four nectarious glands. The germen is the length of the stamens, slender and round, with a sessile stigma; it becomes a bivalved compressed pod, an inch in length, which, when the seeds are ripe, opens elastically, and rolls back in a spiral form. The seeds are many and round.

Qualities. — Every part of the plant is inodorous; but the flowers and leaves are slightly bitter and pungent, having, when fresh, in an inferior degree, the taste of water-cresses. The leaves are often added to spring salads.

Medical properties and uses. — Cardamine flowers are said to be diuretic and antispasmodic. They were supposed to be useful in all affections of the head by the ancients[1]: but their efficacy in spasmodic diseases was first mentioned by Dale[2], on the authority of a MS. of Dr. Tancred Robinson; and they were afterwards, in the year 1767, strongly recommended by Sir George Baker[3], who had successfully used them in the cure of chorea, spasmodic asthma, and some other convulsive affections. Dr. Odier of Geneva[4] mentions a case of *incubus* which was cured by their use, although it had resisted several other antispasmodic medicines. They sometimes produce diaphoresis, but have otherwise little sensible operation. They are seldom used. The leaves have been regarded, as possess-

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[1] *Cuckoo flowers* form a part of the wreath "of idle weeds," with which Shakspeare has decorated the head of Lear, in his madness.

[2] *Pharmacol.* 204.

[3] *Med. Trans.* i. 442.

[4] *Manuel de Médecine pratique*, &c. Lect. xvi.

ing antiscorbutic qualities, but they have very little efficacy. The dose of the dried flowers powdered is from one drachm to three drachms, given twice or thrice a day.

CARDAMOMUM. Vide *Alpinia Cardamomum.*

CARICÆ FRUCTUS. Vide *Ficus Carica.*

CARUM.[1] *Spec. Plant. Willd.* i. 1470.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

G. 561. *Fruit* ovate-oblong, striated. *Involucre* one-leafed. *Petals* keeled, inflex, emarginated.

Sp. 1. C. *Carui.* Common Carraway. *Med. Bot. 3d ed.* 102. *t.* 41. *Eng. Bot. Smith's Flora Britan.* 330.

Officinal. CARUI, *Lond. Edin.* CARUM CARUI; SEMINA, *Dub.* Carraway seeds.

Syn. Carvi (*F.*), Kummelsamen (*G.*), Veldkemyn (*Dutch*), Kommer (*Dan.*), Brödkummin (*Swed.*), Karny (*Pol.*), Tmin (*Russian*), Carvi (*I.*), Alcaravea (*S.*), Alcaravia (*Portug.*), Dshintan (*Javanese*).

Carraway is an indigenous, biennial, umbelliferous plant, growing wild in meadows and pastures; but cultivated in several parts, particularly in Essex, for the sake of its seed. The flowers expand in May and June, and the seeds ripen in August. The root is fuciform; the stem smooth, channelled, branching, and seldom exceeding three feet in height; with smooth, doubly pinnate, incised leaves, the pinnulæ or segments of which are narrow, linear, pointed, and of a deep green colour. The flowers are in numerous, terminal, erect umbels, generally of ten rays, furnished with an involucre consisting of narrow leaflets, solitary, or two to three together, often altogether deficient; and without any partial involucre. The petals of the flowers are five, nearly equal, obtuse, inflective, white, or of a pale blush colour; the filaments slender, rather longer than the petals, and bearing small roundish anthers; and the germen inferior, supporting very short capillary styles with simple stigmas. The seeds are two, oblong, bent, about one fourth of an inch in length, of a brown colour, with five moderately elevated, longitudinal, straw-coloured ridges, the interstices being also obscurely furrowed. Carraway plants do not perfect their seeds until the second year. They are cut down in July, and the seed thrashed out on a cloth. The seeds are used by the London confectioners and bakers, as well as for medicinal purposes.

Qualities.—Carraway seeds have a pleasant aromatic odour, and a sweetish, warm, pungent taste, depending on a volatile oil which is almost completely extracted by rectified

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[1] Κάστορος ὄρχις Dioscoridis. Careum, non Carum, Latine dici deberet. Conf. *Plin.* l. xix. sect. 49. *Gærtner.*

spirit, and in an inferior degree by water. By distillation with water the whole is elevated, and an insipid extract remains.

Medical properties and uses. — These seeds are carminative and stomachic. They are used in flatulent colic and hysteria; and to give warmth to purgatives and other active remedies.

The dose in substance is from grs. x. to ʒ ij.

Officinal preparations. — *Oleum Carui,* L. D. *Aqua Carui,* L. D. *Spiritus Carui,* L. E. D. *Spiritus Juniperi comp.* L. D. *Tinctura Cardamomi composita,* L. D. *Tinctura Sennæ composita,* L. D. *Confectio Opii,* L. D. *Confectio Rutæ,* D. *Decoctum Anthemidis nobilis,* E.

CARYOPHYLLUS. *De Candolle, Prodromus.*

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Myrtaceæ.

G. 972. *Calyx* four-parted, superior. *Petals* four. *Berry* one-celled, one-seeded.

Species 24. C. *aromaticus.*[1] The Clove Tree. *De Candolle, Prod. Syst. Nat.* pars iii. *Hook's Bot. Mag.* 2749, 2750. *Journal de Physique,* tome xiv. 47. *t.* 1.

Officinal. CARYOPHYLLUS, CARYOPHYLLI OLEUM, *Lond.* CARYOPHYLLUS AROMATICUS. *Floris germen, et ejus Oleum volatile, Edin.* FLORES NONDUM EXPLICITI, ET OLEUM VOLATILE, *Dub.* Cloves, and Oil of Cloves.

Syn. Cloves: Clousèle Girofles (*F.*), Gewürz nelken (*G.*), Kruidnagel (*Dutch*), Kryde nellike (*Dan.*), Kryddnegliker (*Swed.*), Gozdz do Potraw (*Pol.*), Gwasditschka (*Russ.*), Clavo de espicia (*S.*), Cravo da India (*Port.*), Garofano (*I.*), Kerunful (*Arab.*), Laung (*H.*), Lavanga (*San.*), Craumboo (*Tam.*), Bruah Lawang (*Malay*). *The oil:* Huile de Girofle (*F.*), Nelkenöhl, (*G.*), Olio di Girofano (*I.*), Azeyte de Clavos (*S.*), Craumbootylum (*Tam.*), Woorála tail (*Cyn.*).

The clove tree is a native of the Moluccas, where it was originally abundantly found, particularly at Machian; but the narrow policy of the Dutch led them to destroy almost all the trees except those which they cultivated on the islands of Amboyna, Honimoa, Oma, and Nousalant, so as to give them a monopoly of the trade, which they have held since 1638. The French, however, obtained some plants which they carried to the Isle of France, in 1770; and thence in 1774, to Cayenne. In 1789 it was also introduced into the island of Dominica, by William Urban Buêe, Esq.; and in 1803, into the island of Sumatra, by Mr. William Roxburgh. At all these places it is now cultivated. It is a handsome tall tree, rising upon a stem of very hard wood, covered with a greyish smooth bark. The leaves are ovato-oblong, and pointed at both ends; firm, with many parallel nerves on each side of the midrib; entire, sinuated, and supported on brown pe-

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[1] Καρυόφυλλα Græcorum.

tioles, about half the length of the leaf. The colour of the leaves is dull green; and, when bruised, their odour is strong and aromatic. Its flowers are in terminal cymes, which generally consist of 9, 15, or 21 flowers. The calyx is oblong, woody, and divided at the brim into four small-toothed segments. The corolla consists of four roundish, notched, small petals; enclosing many slender filaments inserted into the calyx, bearing simple anthers. The germen is oblong, with a simple style; the fruit an inferior, coriaceous, bilocular berry.

The clove-tree yields its first crop of cloves at the age of six years; and attains its highest state of bearing at twelve. The existence of the tree is limited to twenty-four years. Although the unopened flowers of this tree, and even the leaves, particularly their petioles, are extremely aromatic and odorous, yet the flowers are inodorous when they are fully blown; and the real fruit is not aromatic.[1] The cloves are the unexpanded flowers, which are first obtained when the tree is six years old. At Amboyna they are collected from October to December, when they begin to redden. They require to be dried quickly: on which account they are first immersed in boiling water; then exposed to smoke and a heat of 120° Fahr. till they begin to assume a brown hue; and afterwards the drying is finished in the sun. In the West Indies, those cloves which are dried altogether in the sun are considered the best.

Cloves were first introduced into Europe by the Arabians, who brought them from India. They are imported into this country from the Dutch settlements; the best in chests, and an inferior kind in bags. The oil is brought in bottles; but a considerable quantity is drawn in this country. The best variety of the Amboyna cloves is smaller and blacker than the other varieties, very scarce, and as a mark of pre-eminence is named the *Royal* clove. The Dutch sometimes mix among the best cloves those from which the oil has been drawn; and the fraud is not easily discovered, as the used cloves regain part of their flavour by this mixture. The oil is also much adulterated: and when it has a hot, fiery taste, and a great depth of colour, it may be suspected.

Qualities.—Good *cloves* have a strong, fragrant, aromatic odour, and a hot, acrid, aromatic taste, which is very permanent. In form they resemble a small nail, scarcely exceeding half an inch in length; with a roundish conical head, and directly under it four sharp, spreading points, concave

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[1] *Journal de Physique*, l. c.

above. Their colour is deep reddish brown; the conical part of the head being lighter, and yellowish; and this part is very easily separated. To the touch they feel somewhat greasy. Water extracts their odour, but little of their taste: alcohol takes up both; and, when evaporated, the extract is pungent and fiery without any odour. Ether extracts completely their sensible qualities; and when the tincture is evaporated on water, a considerable portion of a very pungent, hot, unctuous resin and some extractive remain.

Cloves yield by distillation in water one sixth of their weight of a heavy, nearly colourless oil, which becomes yellow by age. Its sp. gr. is 1·232. It has the flavour of the cloves, but is comparatively milder. The Dutch oil is deeper, and of a reddish colour; and is extremely pungent and fiery; owing, it is supposed, to its containing in solution some of the resin of the cloves extracted by alcohol.[1] According to M. Lodibert, they yield a crystalline principle, which he has named *Caryophilline.* He considers it a subresin, and has found it only in Molucca and Barbadoes cloves; those from Cayenne containing none of it.

Medical properties and uses.—Cloves are stimulant in a greater degree than any of the other aromatics. They are sometimes given alone in dyspepsia, when it is attended with a very languid state of the circulation, and a sense of coldness in the stomach; and in atonic gout: but they are chiefly used as corrigents to other medicines. The tincture ordered by the French Codex is a useful preparation.[2] The *oil* is used as a corrigent to griping extracts; and sometimes as a local application in toothach. The dose of powdered cloves may be from grs. v. to grs. x.; that of the oil ♏ij. to ♏vj., triturated with sugar.

Officinal preparations.—*Infusum Caryophyllorum,* L. *Infusum Aurantii compositum,* L. D. *Spiritus Lavandulæ comp.* D. *Spiritus Ammoniæ aromaticus,* L. *Mistura Ferri aromatica,* D. *Confectio aromatica,* L. D. *Confectio Scammonii,* L. D. *Vinum Opii,* L. D.

CASCARILLA. Vide *Croton Cascarilla.*

CASSIA. *Spec. Plant. Willd.* ii. 513.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

G. 813. *Cal.* five-leaved. *Petals* five. *Anthers* three superior, barren; the three lower ones beaked.

* *Sennas.*

Sp. 18. C. *Fistula.* Purging Cassia. *Med. Bot. 3d ed.* 445. *t.* 160. (Conna) *Hort. Malabar. Part* i. p. 37. fig. 22.

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[1] Vauquelin obtained an oil resembling that of the clove from the leaves of Agathophyllum *Ravensara.*

[2] It is made with ℥ij. of cloves, and ℥viij. of alcohol, 32° Beaumè, digested for six days and filtered.

Sp. 24. C. *Lanceolata.* Lanceolate Cassia. *De Candolle, Prodromus Syst. Nat.*
Sp. 25. C. *Obovata.* Obovate Cassia.

1. CASSIA FISTULA.[1]

Officinal. CASSIÆ PULPA, *Lond.* CASSIÆ FISTULÆ FRUCTUS, *Edin.* CASSIA FISTULA; PULPA LEGUMINIS, *Dub.* Cassia pulp.

Syn. Casse (*F.*), Rohnkassie (*G.*), Pypkassie (*Dutch*), Cassievër (*Dan. Swed.*), Polpa di Cassia (*I.*), Fistularis (*S.*), Ameltàs (*H.*), Suvernaca (*San.*), Konnekai (*Tam.*), Khyar Sheber (*Arab.*), Khyar Chirber (*Pers.*), Drangu (*Jav.*), Mentus (*Malay*), Sonali (*Beng.*).

This tree is a native of both the East and West Indies and of Egypt. It rises to the height of forty or fifty feet, with a large trunk, covered with a soft cineritious bark, and is much branched at the top. The leaves are composed of six pair of ovate, pointed, undulated pinnæ, of a pale green colour, with many transverse nerves, and peduncled: the stipules are scarcely apparent. The flowers, which appear in June, are of a golden colour, placed upon long pendent terminal spikes.[2] The leaves of the calyx are crenated, blunt, and greenish; the petals unequal, spreading, and waved. The three undermost filaments are long and incurved; the others exhibit large anthers, three of which are rostrated, or like the open beak of a bird, at the extremity. The fruit is a long, woody, dark brown pod, about the thickness of the human thumb, and nearly too feet in length, cylindrical, with two longitudinal furrows on one side, and one on the other; and divided into numerous transverse cells, each containing one smooth, oval, yellowish, shining seed, with red lines dividing it longitudinally, imbedded in a soft black pulp.[3]

The pods are said to undergo a kind of fermentation, to prepare them for keeping. Those which are brought to this country come principally from the West Indies, packed in casks and cases; but a superior kind is brought from the East Indies; and is easily distinguished by its smaller, smooth pod, and by the greater blackness of its pulp. The heaviest pods, and those in which the seeds do not rattle on being shaken, are the best, and contain the greatest quantity of pulp, which is the part used.

Qualities.—The pulp has a slight, rather sickly odour, and a sweet mucilaginous taste. It is viscid; almost entirely soluble in water, and partially so in alcohol and sulphuric ether. The watery infusion, which shows a tendency to ge-

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[1] Γλυκοκάλαμον Myrepsici, ultimi fere Græcorum medicorum. Chaiarxambar of the Egyptians. *Prosper Alpinus, de Plantis Ægypti*, cap. ii.

[2] Alpinus says, "Sunt etiam hi valde odorati, præsertimque oriente sole." *Ibid.* l. c.

[3] *Gærtner de Fruct.* i. 313. t. 147.

latinize, has, when filtered, a deep brown colour, and yields a precipitate with alcohol, and the solution of the acetate of lead. The alcoholic and ethereal tinctures are not affected by the addition of water; although, when they are evaporated, a thin pellicle of resin remains. No alteration is produced on the alcoholic and watery infusions by infusion of galls, nitrate of silver, sulphate of iron, nor the nitric nor sulphuric acids; chlorine throws down a yellow-coloured precipitate, which is insoluble in ether. Hence there is a reason for concluding, with Vauquelin, that this pulp contains sugar, gelatin, gluten, mucus, a small portion of resin, extractive, and some colouring matter.

Medical properties and uses.—Cassia pulp is gently laxative; but although it is adapted for children and very delicate women, yet it is apt to induce nausea, flatulence, and griping, when taken in doses sufficient for stronger habits. To assist its operation, and prevent the griping, it is usually conjoined with some neutral salt and an aromatic; but it is now rarely prescribed in any case. The dose is ʒiij. to ℥j. or more.

Officinal preparations.—*Pulpa Cassia fistularis expressa,* E. *Confectio Cassiæ,* L. *Electuarium Cassiæ,* D. *Confectio Sennæ,* L. *Electuarium Sennæ comp.* E.

2. CASSIA LANCEOLATA. C. OBOVATA.

Officinal. SENNA, *Lond.* FOLIÆ CASSIÆ SENNÆ, *Edin.* CASSIA SENNA; FOLIA, *Dub.* Senna leaves.

Syn. Séné (*F.*), Sennablätter (*G.*), Sennet (*Swed.*), Liscie Senesowe (*Pol.*), Senne (*Dutch*), Senat (*Dan.*), Senna (*I. & Port.*), Sen (*S.*), Suná (*Arab.*), Sená Mecci (*H.*), Nilaverei (*Tam.*).

These species of Cassia, which yield the Senna of commerce, are annual plants, natives of Upper Egypt, Benou in Central Africa, and India. The best grows in the valleys of Nubia[1], where it is named *Abyreyga;* flowering in July and August. It is the *C. acutifolia* of Delile[2], and furnishes the Tripoli Senna, and forms a large portion of that which is termed Alexandrian. It rises with an erect, branching, woody, whitish stem about two feet in height. At the base of the leaves, which are pinnate, and placed in alternate order, are two narrow-pointed stipules: the leaflets, of which each leaf has five or six pair, are sessile, oblique at the base, oval, pointed, scarcely an inch in length, rather more than one fourth of an inch broad, and of a yellowish green colour. The flowers are yellow, in loose axillary spikes: the calyx is deciduous, consisting of five narrow, obtuse, concave leaflets:

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[1] C. Nectoux. Vide *Phil. Mag.* xv. 55.
[2] Flore d'Egypt, lxxv. tab. 27. fig. 1.

the petals are roundish, concave, entire; the three lower ones larger than the two upper: the undermost filaments also are longer than the others, and furnished with large rostrated curved anthers: and the germen is long and flat, with a short incurved style terminated by an obtuse stigma. The fruit is an ovate, reniform, membranous, leafy, compressed legume, torose and marked with capillary, transverse, parallel striæ: bivalve, with six or nine cells, divided by very thin tranverse partitions, and each containing one oblong heart-shaped seed.[1]

The best Senna, named in Nubia *Guebelly*, or *Sena Mekke*, in Egypt *Sena* of *Seyde*, grows wild, and yields two crops of leaves, the abundance of which depends on the periodical rains. The first crop is collected after the first rains, about the middle of September; the second, in the following March, at which time the fruit is at its full maturity. The plants are cut when the flowers begin to fall, and exposed on the rocks to dry in the sun. This class is the product of Cassia *acutifolia:* it grows chiefly in a valley called Bicharie, near Syène, in Abyssinia. The second class is the product of the Cassia *obovata:* it is found chiefly in Upper Egypt, and is less purgative than the former. The leaves are picked, packed up in bales, and sent to Boullac, the great entrepôt of Senna[2], where they are mixed with two other species of Cassia; one the *C. lanceolata* of Forskal; the other probably the *C. angustifolia* of Willdenow, the leaves of which are longer, narrower, and sharper pointed than those even of the *C. acutifolia*, and come from Mocha; but the leaf with which Senna is adulterated is that of the Cynanchum *oleæfolium*, known in Egypt by the name of Argel or Arguel. The proportions, according to Dr. Calloden, are five hundred parts of lance-leafed Senna, three hundred of obovate Senna, and two hundred of Argel. The two first admixtures are nearly equally good as the other Senna, but the last is truly an adulteration. It can be readily distinguished by attending to the following rules:

1. The leaf of argel (2) is an inch or fourteen lines long, while that of Senna *acutifolia* and Senna *obovata* (1. 4.) never exceeds nine lines. 2. The leaf of argel has a straight side; and the lateral nerves are not seen on the under disk, while those of Senna are conspicuous. 3. The leaf of argel is regular at its base (*a*, *b*), the two sides terminating at the

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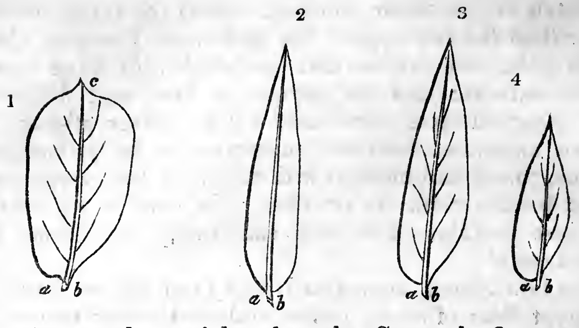
[1] *Gærtner de Fruct.* ii. 312. t. 146.

[2] Burckhardt says that the Bedouin Arabs, who are the chief collectors of senna, sell it to the merchants of Esne at about one pound sterling per camel load (from 400 to 500 weight).—*Travels in Nubia*, 4to. p. 31.



same point on the petiole; but the Senna leaflets are oblique, one of the sides being larger, and produced lower on the petiole, than the other (*a*, *b*, 1. 3, 4).[1] There is also reason for thinking that it is further adulterated with the leaves of *Colutea arborescens*, bladder Senna, those of *Coriaria myrtifolia*, and of box: but these are easily distinguished from Senna leaves. The Senna, after being thus mixed, is repacked in bales, at Alexandria, whence it is exported to Europe.[2] A good deal of Senna has been imported from *Calcutta* under the name of East Indian Senna. It is evidently the Cassia *lanceolata* (3)[3]: it was formerly taken to India from the Persian Gulf, and was the growth of Mekka; but much of it is now cultivated at Tinnivelly, on the Malabar coast. It is called Senna Mekki and Tinnivelly Senna, in the Indian bazaars.

Qualities.—The odour of Senna leaves is faint, rather disagreeable, and sickly; the taste slightly bitter, aromatic, sweetish, and nauseous. Boiling water extracts about one third of the weight of the leaves employed, but it requires a pint of boiling water to extract all the active matter from ℥j. of Senna leaves. The infusion has a deep reddish brown colour, with the odour and taste of the leaves. This infusion, when exposed to the atmosphere, deposits a lemon-yellow coloured, insoluble matter: and a precipitate is produced by the strong mineral acids, oxalic acid, the carbonates of the alkalies, lime-water, subacetate and acetate of lead, nitrate of

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1 *Hist. Nat. et Méd. des Casses, &c.* Par L. T. Fred. Calloden de Génève, M.D. 4to. Planches, Montpelier, 1816.

2 Nectoux says, that the palthier, or senna manager of Alexandria, acknowledged that the product of the two crops varies from 700 quintals to 1100 or more, one third of which is *argel*, and the sale is 1400 or 1500 quintals (more probably from 1500 to 1600).—*Phil. Mag.* i. c. Burckhardt says, that for many years the senna trade has been exclusively in one hand, being farmed by Mohamed Aly; and that "M. Rosetti has paid for the monopoly of senna 150 purses per annum, or about 3500*l.*"—*Travels in Nubia*, 4to. 1819. p. 53.

3 The Cassia *Marilandica*, a native of the United States of America, is a variety of C. *lanceolata*.

silver, sulphates of iron, muriate of baryta, and several other substances. (See *Infusum Sennæ* among the preparations.) Alcohol and sulphuric ether, digested on the powdered leaves, acquire a deep olive-green colour. When the ethereal tincture is poured on the surface of pure water, a dark olive pellicle remains after the evaporation of the ether, which is almost insipid, and has all the properties of resin; and a golden-yellow colour is communicated to the water.[1] The alcoholic tincture is rendered only slightly milky by the addition of water, and scarcely any precipitate is produced; but a copious one is thrown down by chlorine. The active principle of Senna, according to the experiments of MM. Lassaigne and Fenuelle, is a saline substance which they have named *cathartin* (cathartia). It is uncrystallizable, and as usually obtained, of a reddish yellow colour, deliquescent, with a peculiar odour, and bitter nauseous taste. It is soluble in alcohol and in water, but insoluble in ether.[2] Its watery solution is precipitated by infusion of galls, and the subacetate of lead; but not by the acetate of lead, tartar emetic, gelatin, iodine, nor the alkalies, although the latter deepen its colour. According to Bouillon Lagrange, the residue of the watery infusion, evaporated to dryness and burnt, yields potassa, sulphate of potassa, carbonate of lime, magnesia, and silica.

Medical properties and uses.—Senna is purgative, generally operating under four hours after it is taken; and is well adapted for all cases in which the bowels require to be certainly, yet moderately, evacuated. In many habits it is apt to occasion griping, and therefore requires the addition of some aromatic, as carraway or cardamom seeds, or ginger; and its operation to be assisted by drinking plentifully of weak broths or gruel. The griping seems to be occasioned by the resinous matter, as the infusion made with cold water does not gripe, although it purges. Its purgative powers are augmented by camphor, bitters, and decoction of guaiacum. Senna may be given in substance powdered; but the more usual form is that of In-

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[1] This colour may be produced by some extractive being taken up by the ether, closely united to the resin.

[2] *Annales de Chym. et Phys.* xvi. 20. Cathartin is obtained by precipitating a filtered decoction of senna by acetate of lead; and passing through the decanted fluid sulphureted hydrogen gas. The fluid is next evaporated to dryness, the extract digested in alcohol, and the alcoholic solution evaporated to dryness. This result is to be digested in alcohol acidulated with sulphuric acid, the effect of which is to throw down an insoluble sulphate of potassa, which must be separated by the filter. Any excess of sulphuric acid in the fluid must be precipitated by acetate of lead, after which sulphureted hydrogen is to be passed through the fluid, and this, being filtered and evaporated to dryness, is the cathartin.

fusion. Decoction is a bad form, as the activity of the medicine is much impaired by the boiling: owing, according to Gren, to the total dissipation of the nauseous and volatile principles; but, in our opinion, it is owing to the oxidizement of the extractive, which also accounts for the severe gripings induced by the decoction. The dose of the powder of the leaves is from ℈j. to ʒj. but it is seldom given alone.

Officinal preparations.—*Confectio Sennæ*, L. E. *Electuarium Sennæ*, D. *Extractum Cassiæ Sennæ*, E. *Infusum Sennæ compositum*, L. D. *Infusum Tamarindi cum Senna*, E. D. *Tinctura Sennæ*, E. D. *Tinctura Sennæ composita*, L. E. D. *Syrupus Sennæ*, L.

CASTOR. *Syst. Nat. Gmelin.* 124.

D. 1. Mammifera. *Ord.* 4. Rodentia. *Cuvier.*

G. 23. *Fore-teeth* in the upper jaw truncated, hollowed with a transverse angle; in the lower, transverse at the point. *Grinders* in both jaws four. *Tail* long, depressed, flat, horizontal, scaly. *Clavicles* perfect.

Species 1. C. *Fiber.* The Castor Beaver. *Jonst. Quadr.* p. 147. *t.* 68. *Buff.* viii. xxxii. *Cuvier, Règ. Animal,* vol. i. p. 190.

Officinal. CASTOREUM[1], *Lond. Edin. Dub.* Castor; Russian and Canadian.

Syn. Castoreum (*F.*), Kastoreunt, das Bibergeil (*G.*), Bevergeil (*Dutch*), Baevergel (*Dan.*), Bäfvergall (*Swed.*), Stroy Bobrowy (*Polish*), Castoro (*I.*), Castoreo (*S.*), Ash batchegan (*A.*), Goond beyduster (*Pers.*), Beuer, Bever (*old Scotch*), Los lydan (*Gaelic*), Afange (*Welch*).

The beaver is an amphibious quadruped, found in the northern parts of Europe, Asia, and America[2], inhabiting the wooded uninhabited banks of deep rivers and lakes, in which situations it is gregarious, and constructs its habitation with greater skill than any other animal except man. The hut, if it may be so named, serves for more than one family, and consists of two stories, the upper one for the animals, and the lower for the provisions. The body is thick, under three feet in length, and covered with short iron-brown and chesnut-coloured hair: the feet are five-toed, and the hind ones webbed: the eyes small, round, and so acutely sensible of light as to remain open only in dull weather; and the ears short, hairy, and so formed, that the meatus is closely shut, when the animal plunges and is beneath the water. The tail is gray, about half the length of the body, flat, horizontal,

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[1] Κάρος Dioscoridis. The ancients erroneously believed that the castor follicles were the testicles of the beaver.

[2] It has been asserted that the beaver is found also in Africa; yet naturalists have not been able to find more than one species. It was formerly found in Wales, in the river Teivi. Giraldus Cambrensis mentions them in 1188. Sibbald has the following sentence—"Boethius dicit fibrum seu castorem in Scotia reperiri."—*Prod.* p. ii. l. 3. p. 10.

scaly, with that part only of it which is next to the body covered with hairs. Between the anus and the external genitals are four follicles, of an oblong shape, smaller above and larger below; the two smaller are filled with a fatty substance, while the two larger contain each about two ounces of an oily, viscid, strong-smelling substance, enclosed in membranous cells, which is the officinal castor.

When the beaver is taken, the follicles are cut off entire, and dried, either by exposure to the sun or in smoke. The castor is at first nearly fluid, but gradually becomes solid and viscid, occasionally perfectly dry and pulverulent. The best comes from Russia; but of late years it has been very scarce,—and all that is now found in the shops is the produce of Canada. The cods of the Russian Castor are large, dry, roundish, heavy, and solid, appearing, when cut, of a reddish liver colour; those of the Canadian are smaller, hard, oblong, thin, and corrugated on the outside. The Canadian castor, when treated with ammonia, affords an orange-coloured product; the Russian a white. In each beaver there is a large and small bag, and the castor in the larger bag is always the best. The goodness of the castor is determined by its sensible qualities; that which is quite black is insipid, inodorous, oily, and unfit for use. Castor is said to be sometimes counterfeited by a mixture of some gummy and resinous substances, with a little real castor, artificially interspersed with membranes, and stuffed into the scrotum of the goat.[1] The fraud is easily detected by comparing the smell and taste with those of real castor, and by the deficiency of the sebaceous follicles, which are always attached to the real cods.

Qualities.—The odour of castor is strong, heavy, and aromatic; the taste bitter, sub-acrid, and nauseous. It feels slightly unctuous, and is of a red-brown colour. Its odorous principle it dissipated by coction with water; but when it is simply infused in boiling water, its sensible qualities are in a small degree imparted to the infusion, which has a yellow colour, and shows the presence of an alkali, by changing to green the vegetable blues. Alcohol and sulphuric ether dissolve the resinous part of the castor, which remains after the evaporation of the menstrua, and retains all the odour and taste of the drug. According to the analysis of Bouillon Lagrange, castor contains the carbonates of potassa, lime, and ammonia, iron, resin, a mucilaginous extractive matter, and a volatile oil. Canadian castor contains benzoic acid, both free

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[1] *Duncan's New Edinburgh Dispensatory,* 5th edit. p. 220.

and combined.[1] Bonn, who examined Russian castor, found in it a volatile oil, adipocire, resin, and lime.[2] M. Brandes found in it a peculiar principle which he termed *castorin;* which crystallizes in long, semitransparent prisms, with the smell of castor, and having a coppery taste; insoluble in cold water and cold alcohol, but soluble in boiling alcohol and in the volatile oils.

Medical properties and uses.—Castor is antispasmodic, and emmenagogue. It was formerly given in combination with myrrh as a specific in quartans[3]; and is still prescribed, with seeming advantage, in low nervous fevers, hysteria, epilepsy, and spasmodic affections: and from the idea of its action being particularly determined to the uterine system, it is supposed to prove useful in amenorrhœa and chlorosis. It may be exhibited either in powder or in the form of tincture; but owing to the scarcity and the high price of good castor, it is seldom ordered; and the materia medica certainly contains many better antispasmodics.

The dose of powdered castor is grs. x. to ℈j., given as a bolus.

Officinal preparation.—*Tinctura Castorei,* L. E. D.

CENTAUREA. *Spec. Plant. Willd.* iii. 2277.

Cl. 19. *Ord.* 3. Syngenesia Frustranea. *Nat. ord.* Compositæ.

G. 1548. *Receptacle* bristly. *Seed-down* simple. *Corolla* of the ray funnel-shaped, longer, irregular.

***** Calcitrapæ; *with the spines of the calyx compound.*

Species 89. C. *benedicta.*[4] Blessed Thistle. *Med. Bot. 3d edit.* 34. *t.* 14. Cnicus benedictus, *Gærtner.*

Officinal. CENTAUREÆ BENEDICTÆ HERBA, *Edin.* CNICUS BENEDICTUS; FOLIA, *Dub.* The herbaceous part, or the leaves of Blessed Thistle.

Syn. Chardon benit (*F.*), Kardo benediktenkract (*G.*), Kardebenedict (*Dutch*), Korbenedikt (*Dan.*), Kardebenedikt (*Swed.*), O set Wloski (*Polish*), Cardo santo (*I.*), Cardo benedito (*S.*).

This is an annual plant, a native of Spain and the Grecian islands, flowering in June and September; and cultivated in the gardens of this country, where it thrives as well as in its native soil.[5] The root is whitish, cylindrical, and branched; the stem erect, roundish, channelled and rough, about two feet in height, and branched towards the top. The lower leaves are peduncled, but the upper sessile, and in some degree decurrent; the whole are long, elliptical, rough, runcinate,

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[1] Laugier. *Ann. de Mus. d'Hist. Nat.* t. ix. p. 323.

[2] *Bonn. Anatomia Castoris atque Chemica Castorei Analysis.* 1806.

[3] Sennertus de Febribus, lib. ii. cap. 20.

[4] Ἄκαρνα Theophrasti.

[5] It was described as being cultivated in England by Gerarde in 1597.

and barbed with sharp points; of a bright green colour above, whitish underneath, and reticulated. The flowers are surrounded by an involucre of ten leaves, the five exterior of which are larger: the calyx is oval and woolly, and each scale terminated by pinnate, spinous points: the florets are of a yellow colour, those of the ray small, trifid, and sterile; the seeds have a paleaceous receptacle, are brown, pyriform, a little curved, deeply striated, and crowned with a double pappus, the outer one calyculate, the inner spinous.[1]

This plant is in greatest perfection when in flower; at which time it should be cut, quickly dried, and preserved in a dry airy place.

Qualities.—The odour is weak, yet unpleasant; the taste intensely bitter, but not very permanent. Its virtues are extracted both by water and alcohol. The watery infusion has a pale greenish-yellow colour, which is changed to a deep olive by sulphate of iron, and an orange-brown by the pure alkalies, although the carbonates do not affect it. Nitrate of silver and acetate of lead occasion copious precipitates, and are therefore incompatible with this infusion.

Medical properties and uses. — Carduus benedictus is either emetic, diaphoretic, or tonic, according to the form and strength of the preparation in which it is administered. The decoction and strong infusion provoke vomiting; the less strong warm infusion determines powerfully to the surface, occasioning a copious flow of sweat; and the light infusion, made with six drachms of the leaves and one pint of cold water, is an elegant and efficacious bitter in loss of appetite, and the dyspepsia which is occasioned by irregularities. It was formerly supposed to possess such extraordinary medicinal powers, as to deserve the appellation *benedicta;* but it is seldom used in modern practice. The dose of the powdered herb is from grs. xv. to ʒj.; that of the infusion f ℥ij. given every three hours.

CENTAURIUM. Vide *Erythræa Centaurium.*

CEPHAELIS. *Spec. Plant. Willd.* i. 977.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Cinchonaceæ.
G. 357. *Flowers* in an involucred head. *Corolla* tubular. *Stigma* two-parted. *Berry* two-seeded. *Receptacle* chaffy.
Species nova. Cephaëlis *Ipecacuanha.*[2] Ipecacuan, *Linn. Soc. Trans.* vi. p. 137. t. 2. *De Candolle, Prodromus. Martin's Sp. Mat. Med. Brazil.*

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[1] *Gærtner de Fruct.* ii. 385. t. 162.
[2] As Willdenow, following Swartz, has united the genus Callicocca with that of Cephaëlis, we have referred the Ipecacuanha to this genus.

Officinal. IPECACUANHÆ RADIX, *Lond. Edin. Dub.* The root of Ipecacuan. *Woodville's Med. Bot. 3d edit.* vol. v. t. 11.

Syn. Ipecacuanne (*F.*), Brechwerzel (*G.*), Krakrot (*Swed.*), Ipecacuana (*I.*), Ipecacuanha o Bejuquillo (*S.*), Cipo (*Port.*).

This plant is a perennial, found growing in shadowy moist situations, in the forests of the provinces of Pernambuqua, Bahia, Rio Janeiro, Paulensia, Mariannia, and other provinces of the Brazils; flowering in December, January, February, and March; and ripening its berries in May. The root is simple, or somewhat branched, and furnished here and there with short radicles: it is roundish, three or four inches in length, and two or three lines in thickness; bent in different directions, externally brown, and annulated with prominent, unequal, roughish rings. The stem is procumbent at the base, rising from five to nine inches in height, round, the thickness of a hen's quill; smooth, brown, leafless, and knotted in the lower part, but leafy towards the apex: after the first year, it throws out runners, from which, about six inches apart, new erect stems arise. The inferior leaves are caducous, so that not more than eight generally remain at the summit of each stem when it flowers; they are almost sessile, opposite, spreading, ovate, pointed at both ends, three or four inches long, and less than two broad; of a deep green colour on the upper surface, and of a whitish green, downy, and veined on the under. At the base of each pair of leaves are sessile, fimbriated, short, withering stipules, embracing the stem. The flowers are aggregated in a solitary head, on a round, downy footstalk, terminating the stem, and encompassed by a four-leaved involucre. The florets are sessile, from 15 to 24 in number, interspersed with little bractes: the calyx is very small, five-toothed, superior, and persistent; the corolla monopetalous, the expansion shorter than the tube, and divided into five ovate, acute, recurved segments: the filaments are short, capillary, inserted in the upper part of the tube, and bearing long erect anthers: the germen inferior, supporting a filiform style, with two obtuse stigmas the length of the anthers; becoming a soft one-celled berry, of a reddish purple colour changing to black, and containing two oval seeds.

According to De Candolle, the term Ipecacuanha in South America implies generally *vomiting root;* and, therefore, he says, it is applied to the roots of very different species of plants: but the Indians give the name *Poaya* to all emetic roots. But the name is derived from *Epi*, root; and *Cacuanha*, the name of the place where it is most abundantly found. The plant, however, which we have described from Professor Brotero's description published in the sixth volume of the Linnean Transactions, and the Psycotria *emetica*, which

Mutis says yields the Peruvian gray ipecacuan, are the plants that yield the varieties of the root brought to this country.[1] We have found very little of the white ipecacuan, which is the root of the Richardia *emetica*, in any of the specimens of the ipecacuan of the shops which we have examined. Both the gray and the brown varieties of the root are brought to this country packed in bales from Rio Janeiro. Both are, in short, wrinkled, variously bent, and contorted pieces, which break with a resinous fracture. The gray is about the thickness of a small quill, full of knots and deep circular fissures, that nearly reach down to a white, woody, vascular cord that runs through the heart of each piece; the external part is compact, brittle, and looks smooth; the brown is smaller, more wrinkled, of a blackish brown colour on the outside, and whitish within: the white is woody, and has no wrinkles.

In choosing ipecacuanha, the larger roots, which are compact, and break with a resinous fracture, having a whitish gray, somewhat semitransparent appearance in the inside of the cortical part, with a pale straw-coloured medullary fibre, are to be preferred.

It is impossible to ascertain at what period the effects of this root were first known in America, where the Indians used it as an emetic before their connection with Europeans; but although Piso described its uses fully in his Natural History of Brazil so early as 1618, and brought the root to Europe, yet it was scarcely used by Europeans before the year 1700. It was carried to France by a French physician of the name of Le Gras, in 1672; but it did not attract general attention until it was, a third time, introduced by a French merchant of the name of Grenier, who brought 150 lbs. of it from Spain in 1686, with which trials were made at the Hôtel Dieu. John Helvetius, grandfather of the celebrated Helvetius, first made known its use in dysentery, and was rewarded by Louis XIV. with 1000*l.* sterling and public honours for the discovery, and for making it public.

Qualities.—The entire root is inodorous, but the powder has a faint disagreeable odour. The taste is bitter, sub-acrid, and extremely nauseous. Water at 212° takes up rather more

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[1] The title of Ipecacuan is generally given to the roots of the following plants, besides those mentioned above, in South America: Viola *parviflora*, V. *Ipecacuanha*, V. *Calceolaria*, Cynanchum *Ipecacuanha*, C. *tomentosum*, and Asclepias *curassavica*; and according to M. Martius, to Richardsonia *scabra*, R. *emetica*, Polygala, Poaya, Ionidium *Ipecacuanha*, I. *brevicaule*, I. *urticæfolium*, Chiococca *anguifuga*, C. *densifolia*, Manettia *cordifolia*; and sometimes to Euphorbia *Ipecacuanha*, Dorstenia *Brasiliensis*, and D. *arifolia*.

In St. Domingo, several species of Ruellia, which provoke vomiting, are named false Ipecacuan.—*Nouveau Dictionnaire d'Histoire Naturelle*, art. *Ipecacuanha.*

than eight parts in twenty of ipecacuan, but decoction destroys the emetic power of the root; alcohol takes up four parts, and proof spirit six and a half; and the alcoholic is more emetic than the aqueous solution. Various analyses of ipecacuanha have been made in order to detect its emetic principle; but the most satisfactory is that of MM. Majendie and Pelletier, an account of which was first published in 1817.[1] After digesting the powdered root in double its weight of ether, in order to separate any fatty matter, the remainder was treated with four times its weight of highly rectified alcohol, until it ceased to become coloured even when aided by heat. These tinctures, after being allowed to cool, and to deposit some flakes of wax which were separated by filtration, were then evaporated to dryness, and the residue re-dissolved in cold distilled water. Magnesia is next added to the watery infusion, which separates any acid it may contain: the mixture is then filtered and evaporated; and the *emetia* being insoluble is precipitated with the magnesia. The precipitate being washed with cold water and digested in alcohol, this dissolves the *emetia*, and by evaporating the solution the salt is procured. The residue is re-dissolved in a dilute acid, and the *emetia* precipitated by a salifiable base. *Emetia*[2], when pure, is white, inodorous, slightly bitter, easily powdered, and persistent in the air: but it is usually of a reddish brown colour, and in transparent scales. When exposed to a heat stronger than that of boiling water, it is decomposed; furnishing water, carbonic acid, some oil, and acetic acid, charcoal being left. It is sparingly soluble in cold water, and when pure does not deliquesce in a moist atmosphere, although it deliquesces when in the coloured state. It is soluble in alcohol, but not in ether. It is precipitated from its solutions by gallic acid and acetate of lead. To detail the action of other chymical agents on this body is here unnecessary; the results are sufficient to characterise it as a substance *sui generis*. According to Pelletier pure emetia consists of 64·57 of carbon, 22·95 of oxygen, 7·77 of hydrogen, and 4 of nitrogen. Besides emetia, ipecacuanha has been found, by the experiments of the above chymists, to contain a fatty matter, wax, resin, gum, starch, extractive, albumen, gallic acid, and lignine.

The medicinal value of ipecacuanha depends, undoubtedly, on the quantity of emetia it contains; and this varies in the three varieties of the root found in the shops. MM. Majendie and Pelletier obtained 16 parts of it in 100 of the cortical

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[1] Vide *Ann. de Chym. et de Phys.* iv. p. 172., and *Lond. Med. Repository*, viii. p. 252.; also *Dictionnaire de Drogues*, t. iii. p. 261.

[2] The name is derived from εμεω, vomo.

part of ipecacuanha, the root of Cephaëlis *Ipecacuanha* [1]; 14 in 100 of the red annulated variety; 9 in 100 of the striated ipecacuanha, the root of the Pyschotria *emetica* [2]; and 5 only in 100 of a white ipecacuanha, the root of the Viola *emetica.* [3] The woody pith even of the brown variety contains very little emetia, and hence it should be separated in reducing the root to the form of powder.

Experiments made with emetia on animals, prove that it is emetic and purgative, in doses of half a grain, and exerts a specific action on the lungs and mucous membrane of the intestinal canal, and has also narcotic properties: it may be employed instead of ipecacuanha in every case in which this medicine is useful, the dose being more easily regulated, and the effects more certain: but the nausea which it causes continues longer than that of Ipecacuanha. When taken in an over-dose, its action can be instantly paralysed by decoction of galls.

The powder of ipecacuanha is apt to become inert by keeping: and therefore it should be preserved in small phials, well corked, and not exposed to the light. Long-continued boiling also renders it inert.

Medical properties and uses.—Ipecacuanha, when administered in large doses, is emetic; in smaller ones, diaphoretic and expectorant; and in still smaller doses, it acts as a stomachic, stimulating and giving energy to the digestive organs. As an emetic, it is mild, safe, and certain in its operation; but it is a mistake that, when given in larger doses than are necessary, it does not operate more violently, but only in a shorter space of time. It does not act so quickly as many other emetic substances; but it evacuates completely the contents of the stomach, and does not so much weaken it as antimonial emetics. It is given at the commencement of continual fevers, the progress of which is sometimes cut short by its operation; and it is also frequently found to stop the paroxysm of an intermittent, when given immediately before the accession of the cold stage. At the commencement of inflammation of the pharynx, larynx, and trachea, when the inflammation does not run very high, in cynanche tonsillaris, purulent ophthalmy, abscess, and every case in which it is necessary to evacuate the stomach, or to increase the energy of the absorbent system

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[1] The components procured from 100 parts of brown ipecacuanha were as follows: of fatty and oily matter 2; emetic matter (emetia) 16; wax 6; gum 10; starch 42; and ligneous matter 20; the remaining four parts being regarded as loss.

[2] 100 parts of the red variety yielded, of fatty matter 2; emetia 14; gum 16; starch 18; woody matter 48; with merely a trace of wax, and two of loss.

[3] From 100 parts of the white ipecacuanha were obtained, of emetia 5; gum 35; vegeto-animal matter 1; and woody matter 57; besides three of loss.

by full vomiting, ipecacuan has been found useful. As an emetic, however, it is contra-indicated when there is any reason for suspecting inflammation of the encephalon, passive hæmorrhagy, or hernia; and in the advanced stage of typhus fevers, when the pulse is feeble, and the strength much diminished; but in these instances all emetics are hurtful. In doses sufficient to excite nausea without producing vomiting, ipecacuan is given with excellent effects in dysentery[1], and obstinate diarrhœa, in which cases its efficacy seems to arise in a great degree from the nausea, which is kept up by the repetition of the small doses, diminishing the arterial excitement, and determining to the surface; and partly so, as Cullen supposed, from its producing a steady determination of the peristaltic motion of the intestines downwards.[2] Perhaps, also, to these first-mentioned effects of the nausea may be attributed much of the benefit which results from the use of ipecacuan in spasmodic asthma, dyspnœa, pertussis, and epilepsy. In the first of these diseases its emetic power is taken advantage of to relieve the paroxysm, after which it is given in repeated small doses to prevent its return.[3] In nauseating doses also, owing to the nausea lessening the force of the circulation, it has been employed with the best success in uterine and pulmonary hæmorrhages. As a sudorific, it is used in acute rheumatism, arthritic affections, dropsy, and other diseases in which sweating is necessary. It is generally given in these cases, in combination with opium and neutral salts, according to the mode introduced by *Dover*. (See *Pulvis Ipecacuanhæ compositus.*) But we have found it in combination with opium alone in a larger proportion, more efficacious, particularly in rheumatism. Its expectorant powers have been found exceedingly useful in catarrhal affections, pneumonia after bleeding, and in the early stage of phthisis, in which its diaphoretic effect is not injurious as in the latter stage of that disease.

The emetic operation of ipecacuanha is quickened by combining it with tartar emetic; and, on the contrary, it is moderated by opium, and extract of gentian; and destroyed by vegetable infusions containing tannin, and by vegetable acids. Opium, however, is rendered less narcotic when combined with ipecacuanha, although its power of allaying pain is not diminished, while the sudorific effect of the ipecacuanha is much augmented by the combination. We do not, however, agree in opinion with those who think that it is to be

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[1] *Piso, Helvetius, Cleghorn, Pringle.*
[2] *Materia Med.* ii. 477.
[3] *Akenside.*

relied on as an antidote against the deleterious effects of opium; its emetic effect being too slow, and checked by the opium. The infusion of nutgalls is the only certain and powerful antidote for an overdose of ipecacuanha, instantly rendering it inert.

Idiosyncracy occasions some persons to be affected with the most distressing sensation of suffocation, and others suffer from violent sneezing, by the effluvia of this root.

Ipecacuanha is exhibited in substance, and in aqueous and vinous infusions; and on the Continent a syrup of it is used for children.[1] The dose of the powder, to produce full vomiting, is from grs. xx. to ʒ ss.; and of the aqueous infusion, which is made by macerating for an hour ʒ ij. of the powdered root in f ℥ vj. of boiling water, and filtering, f ℥ j. or f ℥ jss. may be given every half hour till vomiting is excited. The emetic effect is continued, and rendered easier to the patient, by drinking, in the intervals of vomiting, large draughts of tepid water. For producing the other effects of ipecacuanha, it is given in doses of one, two, or three grains, generally in the form of pills, repeated every four or five hours: but although its sudorific effect, when begun, is aided and kept up by the use of warm fluids, yet these must not be drunk soon after the dose has been taken.

Officinal preparations.—*Pulvis Ipecacuanhæ compositus,* L. D. *Vinum Ipecacuanhæ,* L. E. D.

CERA. *Lond.* Wax. (*Concretum ab ape paratum.*)

Syn. Cire (*F.*), Wachs (*G.*), Wasch (*Dutch*), Vox (*Dan.*), Wax (*Swed.*), Wosk (*Pol.*), Cera (*I.*), Cera (*S.*), Shuma (*Arab.*), Mom (*H. Pers.*), Medhúchhista (*Sans.*), Mellughoo (*Tam.*), Miellie (*Cyng.*).

The Bee (*Apis mellifica,* a hymenopterous insect,) produces, as the experiments of Huber have proved[2], the wax of which the delicate partitions of the cells of its combs are constructed, from honey, sugar, and the sweet secreted juice found in the nectaries of plants; but the bee does not collect it ready-formed from the anthers of flowers, as has been generally supposed. The organ by which it is secreted has not yet been discovered; but it is deposited in what have been termed wax pockets, situated under the four intermediate ventral segments. These wax pockets are trapeziform, whitish, and of a membranaceous texture; and on them the laminæ of wax are

[1] The following is the mode of preparing the syrup:—Take oz. vj. of Ipecacuanha in fine powder, and pour over it lbs. vj. of cold water, and after twenty-four hours decant it off; then add lbs. vj. more of water; and again lbs. vj. more, a third time, proceeding always as at first. Mix the decanted liquors, and filter; and then with a moderate heat dissolve in them lbs. xij. of refined sugar. One ounce is equivalent to twelve grains of the powder.—*Annales de Chimie,* xlvi. 33.

[2] *Nicholson's Journal,* ii. 182.

found. Wax is, nevertheless, also produced as a secretion by many plants, forming the silvery powder or bloom which often covers their leaves and fruit, and is found in great abundance combined with resin, covering the trunk of the wax-palm (*Ceroxylon Andicola*) of South America[1]; it is also found very pure, encrusting the seeds of the Myrica *cerifera*, or wax-tree of Louisiana and other parts of North America[2]; and the whole of the Benincasa *cerifera*, a species of gourd which grows in China. Wax, in the extended meaning of the term, therefore, may be regarded both as an animal and a vegetable product. But it is the former species only of it, or bees' wax, which is officinal, and demands our present consideration. It is admitted into the list of materia medica under two forms: 1st, As it is procured originally from the combs, combined with colouring matter, or unbleached: and, 2d, Deprived of colour, and purified or bleached.

1. UNBLEACHED WAX.

Officinal. CERA, *Lond.* CERA FLAVA, *Edin. Dub.* Yellow Wax.

Syn. Cire jaune (*F.*), Wachs (*G.*), Gult Wax (*Swed.*), Zotty Wosk (*Pol.*), Cera gialla (*I.*), Cera qualda (*S.*), Munjie Mellughoo (*Tam.*).

Yellow wax is prepared immediately from the honeycomb.[3] The honey is obtained by dripping and pressing the comb, which is then soaked for some days in clear water to extract all the remaining honey, and afterwards melted in a clean vessel with boiling water, and pressed through cloth bags. It is then remelted and cast into round cakes, in which form it is brought to market.[4]

Qualities.—Good and recent yellow wax has a slight odour of honey, is insipid, and of a bright yellow hue. It is brittle, yet soft, somewhat unctuous to the touch, but without adhering to the fingers, or to the teeth when it is chewed; acquires tenacity when heated; melts at 142°, and burns entirely away. Its specific gravity varies from 0·9600 to 0·9650. (For the other properties of wax, see *Cera alba.*)

Wax in this form is often adulterated with earth, pease-meal, or resin and tallow. *Earth*, or *pease-meal*, may be

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[1] This palm is found in the Quindin mountains only, rising 180 feet in height, and having leaves twenty feet long. The waxy secretion covers the trunk to the thickness of about two inches, and consists of two thirds of resin and one of wax. —*Humboldt, Plantæ Æquinoctiales*, &c. fasc. i.

[2] The *pela*, or natural white wax of the Chinese, is an animal wax produced by a species of coccus; and the *white lac* of India appears also to be a variety of wax.

[3] There are bees in India which prepare a black wax.—*Jacquin, Elém. Chim.* p. 34.

[4] Large quantities of wax are imported from the Baltic, the Levant, and the Barbary coast.

suspected when the cake is very brittle, and the colour inclines more to gray than bright yellow: these impurities may be separated by remelting and straining the wax. The presence of *resin* may be suspected when the fracture appears smooth and shining, instead of being granulated; and it may be detected by putting small pieces of the wax in cold alcohol, which will readily dissolve the resinous part, without acting on the real wax. *Tallow* is discovered by the greater softness and unctuosity of the cake, and its disagreeable suffocating smell when melted.

Medical properties and uses.—Yellow wax is scarcely ever ordered for internal use, although its colouring matter does not affect its medical properties. It is chiefly employed in the composition of external applications.

Officinal preparations.—*Cera flava purificata*, D. *Emplastrum Ceræ*, L. E. *Unguenta, et Cerata*, L. E. D.

2. BLEACHED WAX.

Officinal. CERA ALBA, *Lond. Edin. Dub.* White Wax.

Syn. Cire blanche (*F.*), Hwitt Wax (*Swed.*), Biaty Wosk (*Pol.*), Cera biancha (*I.*), Cera bianca (*S.*), Vulay Mellughoo (*Tam.*), Suffiad mooru (*Duk.*).

When yellow wax is exposed, with an extended surface, to the action of light and air, and sprinkled with water, the yellow colour and peculiar odour are lost, and it becomes white. This process is thus performed: The yellow wax is melted with a very little water in a copper vessel, and then run off, through a plug-hole in the bottom, into another vessel, which is covered with a cloth to retain the heat until the water and the impurities settle. The clarified melted wax is next suffered to flow into a vessel, the bottom of which is full of small holes, through which it runs in small streams upon a cylinder kept constantly revolving over, and partly dipping in cold water, into which the wax falls, drawn out into thin shreds or ribands, and is instantly cooled. These are spread upon cloths stretched on frames exposed to the light and air, and occasionally watered and turned; so that after some days the colour nearly disappears. After being thus half-bleached, the wax remains heaped up in a solid mass for a month, when the whole process is again repeated. It is, lastly, generally melted and cast into thin discs about five inches in diameter, in which form it is found in the shops.

White wax is sometimes adulterated with white oxide of lead, in order to increase its weight; with white tallow; and with potato-starch. The first is detected by melting the wax in water, when the oxide falls to the bottom of the vessel: white wax is known to contain tallow, when it is of a dull opaque white, and wants the transparency which distinguishes pure wax; and starch is detected by adding to the suspected wax two per cent. of strong sulphuric acid, and then washing the mixture carefully: the acid carbonizes the starch without acting on the wax.

Qualities.—Pure white wax is perfectly insipid, inodorous, and somewhat translucent. It is harder, less unctuous to the touch, heavier, and less fusible than yellow wax; its specific gravity being from 0·8203 to 0·9662, and its melting point 155°. It is cut easily with a knife, and the surface has a peculiar lustre, which is characteristic, and termed waxy. It melts into a colourless transparent fluid, which concretes again as it cools, resuming its former appearance. Wax is perfectly insoluble in water, and nearly so in cold alcohol, although this fluid takes up about one twentieth of its weight at a boiling temperature; which, however, is again deposited as the fluids cool. Ether acts upon it in the same manner as alcohol. Wax dissolves in the fixed oils, forming the base of cerates and ointments; and unites in some degree, when boiled, with alkalies, forming soaps. The acids at an ordinary temperature scarcely affect it. The products of its decomposition by heat, in close vessels, show that, like the fixed oils, it is a triple compound of carbon, 81·607; hydrogen, 13·859; and oxygen, 4·534, in 100 parts.[1] Dr. John affirms, that 100 parts of wax digested in boiling alcohol is divided into two distinct substances: eighty parts consisting of a body soluble in hot alcohol and oils, and deposited by cooling, and thirteen of a substance completely insoluble in alcohol; the first of which he has named *cerin*, the second *myricin.*[2]

Medical properties and uses.—Wax is regarded as a demulcent, and is sometimes exhibited in obstinate cases of diarrhœa and dysentery, with the view of sheathing the bowels; but its place may be better supplied by simple mucilages and gelatinous solutions. It is generally exhibited diffused in mucilaginous fluids by means of soap, in the proportion of one third part of the wax, with which it is first melted, and then rubbed in a mortar with the fluid, which is gradually added; but Poerner's method, which is, first to melt the wax with olive oil, and then to mix the oily compound while hot with the mucilaginous fluid, by triturating with the yolk of an egg, is a preferable one. The dose is a cupful of the emulsion, containing about ℈j. of wax, given every four or five hours.

Officinal preparations.—*Linimentum simplex*, E. *Unguenta et Cerata varia*, L. E. D.

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[1] Thénard. *Recherches Phys. Chim.* ii. 316.
[2] *Tableau Chim. du Règne Animal*, p. 209.

CEREVISIÆ FERMENTUM. *Lond. Edin. Dub.* Yeast.

Syn. Leveure (*F.*), Güscht (*G.*), Fermento di cervogia (*I*)., Espuma de cerbeza (*S.*)

This substance is the scum or frothy matter which collects on the surface of beer while fermenting. It soon undergoes the putrefactive fermentation, but may be preserved by drying it to the consistence of a slightly cohesive paste; in which state it is sold in Paris. It has been chymically examined by Westrumb, who obtained from it a variety of ingredients[1]; but its essential constituent, or the fermenting principle, is supposed to be gluten, or something very analogous to that vegetable principle. Its medical properties may, perhaps, be attributed to its containing the bitter of the hop, some ready-formed alcohol, and carbonic acid.

Qualities.—Yeast has a vinous, sour odour; a bitter taste; reddens the vegetable blues; and is insoluble in water and alcohol. When it is filtered, a matter remains on the filter which possesses properties similar to those of vegetable gluten; and by this separation the yeast loses the property of exciting fermentation, but recovers it again when the gluter is added. The addition of yeast to any vegetable substance containing saccharine matter excites fermentation in it, and carbonic acid gas is evolved.

Medical properties and uses.—Yeast is tonic and antiseptic. Some years ago it was given with seeming advantage in typhoid fevers attended with symptoms of putridity: but the facts brought forward in support of its efficacy require further confirmation.[2] As an external application, however, to foul and sphacelating ulcers, when united with farinaceous matters in the form of cataplasm or poultice, it is productive of the best effects. It corrects the fœtor of the discharge, assists sloughing, and promotes the formation of a benign and healthy pus.

The dose of yeast is at able-spoonful or two (about f ℥ ss.), repeated every second or third hour: generally combined with porter, or wine, and sugar. It is also administered in the form of a clyster.

Officinal preparation.—*Cataplasma Fermenti,* L. D.

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[1] From 15·142 parts of yeast, heobtained the following substances; potassa 13, carbonic acid 15, acetic acid 10, malic acid 45, lime 69, alcohol 240, extractive 120, mucilage 240, saccharine matter 315, gluten 480, and water 13·595 parts; besides some traces of phosphoric acid and of silica. *Crell's Annals,* 1796, and *Thomson's Chymistry,* 4th edit. v. 406.

[2] It was suggested as a remedy in these complaints by the Rev. Mr. Cartwright.

CERVUS. *Syst. Nat. Gmelin.* 175.

D. 1. Vertebrata. *Cl.* 1. Mammalia. *Ord.* 7. Ruminantia, *Cuvier.*

G. 29. *Horns* solid; when tender covered with a velvety coat, and growing at the apex; shed annually; forked. *Fore teeth* eight in the lower jaw. *Tearing-teeth* none (sometimes solitary in the upper jaw).

Species 1. C. *Elaphus.*[1] The Stag, or Hart. *Johnst. Quadr.* 82. *t.* 32. 35.

Officinal. CORNU, *Lond.* CERVI ELAPHI CORNU, *Edin.* CORNUA CERVINA; RAMENTA, *Dub.* Harts' horns.

Syn. Corn de Cerf (*F.*), Hirschorn (*G.*), Hertshoorn (*Dutch*), Hjorthorn (*Swed.*), Corno di Cervo (*I.*), Cuerno de Ciervo (*S.*), Corne de Veado (*Port.*).

The stag, of which there are three known varieties, is a native of almost every part of Europe, and of the northern parts of America and Asia. In Britain its numbers have been much reduced by the progress of civilisation; but it is still found wild in the highlands of Scotland, the moors bordering on Devonshire and Cornwall, and on the Kerry mountains in Ireland. It is a very beautiful animal, about three feet and a half in height, of a rust-brown colour on the upper part of the body, and whitish below. The horns are annually shed, about the end of February and March; but are soon reproduced in a soft, tender state, full of blood-vessels, and covered with a velvety skin which is lost as they increase in size; and at length, about the month of July, they become hard, compact, and bony. They have no horns till they are above a year old, and these do not branch till the third year; after which the branches increase in number every year, so that the age of the animal may in some degree be determined by them.[2]

These horns differ from those of most other animals, and approach nearer to the nature of bone, containing only less of the phosphate of lime in their composition, and yielding a much larger proportion of gelatine. It is for the sake of the gelatine that their shavings are medicinally used. These are often adulterated with shavings of mutton bones, which, however, are easily detected by their greater degree of brittleness.

Qualities.—Hartshorn shavings when good are inodorous and insipid, pliant, of an ivory-yellow colour; and contain 27 parts of gelatine in 100 parts.[3] Four ounces of the shavings boiled in two pints of water until one pint be dissipated, and the remainder strained, afford, when the decoction cools, a

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[1] Ἐλαφος. *Aristot. Hist. Animal.* ii. c. 7. 18.

[2] The castrated deer is said never to get horns at any period of its life, yet I have the horns of one presented to me by my friend Sir Francis Shuckburgh, Bart., which was reared in his own park; of course he knows its history.

[3] *Annales de Chimie,* xxxiv. 71.

clear, transparent, colourless, insipid, inodorous jelly, which is a compound of gelatine and water.

Medical properties and uses.—The gelatine yielded by stags' horns is considered as a demulcent; but its nutrient properties are more useful than its medicinal virtues. It forms a good article of diet for the sick and convalescent, when it is united with orange juice, sugar, and a little wine; and when mixed with an equal portion of cow's milk, it is very useful in the irritations of infants arising from acidities in the primæ viæ.

Officinal preparations.—*Cornu ustum*, L. D. *Pulvis Antimonii compositus*, L. *Pulvis Antimonialis*, E. D.

CETACEUM. Vide *Physeter macrocephalus*.

CETRARIA ISLANDICA. Vide *Lichen*.

CHIMAPHILA. *Spec. Plant. Willd* iii. 873.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Pyrolaceæ.

G. 873. *Calyx* five-cleft. *Petals* five. *Caps.* five celled, opening at the angles.

Sp. 4. C. *Corymbosa*, *Pursh*, *Flor. Amer.* 1. *p.* 300. *Barton's Veg. Mat. Med. vol.* i. *pl.* 1. *Woodville's Med. Bot.* 5. *p.* 37. *t.* 10.

Officinal. CHIMAPHILA, *Lond.* PYROLA UMBELLATA, HERBA, *Dub.* Herb of winter-green.

Syn. Pyrole, Verdure d'hiver (*F.*), Wintergrün (*G.*), Das Wintergrün (*Dutch*), Wintergroen (*Dan.*), Vintergrön (*Swed.*), Pirola (*I.*), Pippissewa, Herbe de paigné (*Amer. Indians*), Rheumatism Weed, l'herbe à pisser (*Can.*).

The species of Chimaphila is found in several parts of Europe, Asia, and particularly America. It seldom exceeds eight inches in height; is found chiefly in moist, shady places, and in a loose, sandy soil. It flowers in June.

The root is long and creeping: the stems, which rise together from the root, are erect; red at the lower part, yellowish above: the leaves, which are alternate and irregularly whorled, are sub-sessile, lanceolate, and somewhat wedge-shaped, sharply serrated, of a coriaceous texture; bright deep green on the upper and pale on the under disk. The flowers are generally from three to five in number. The calyx is persistent and five-parted: the corolla consists of five roundish, concave, spreading petals, white tipped with rose, and exhales an agreeably spicy odour: the anthers are purple, bifurcated, and supported on awl-shaped filaments: the germen is green, globular, angular, covered with a viscid secretion; and supporting a sessile, thick, persistent stigma. The seed-vessel, which is persistent through the winter, is a five-angled, roundish capsule, inclosing many chaffy seeds, which are discharged by the angles opening.

Qualities.—This plant is astringent, and strikes a black colour with sulphate of iron. Water and alcohol extract the medicinal properties of pyrola, which seem to reside in a gum-resin. Dr. Wolff obtained from 100 parts, 18 of bitter extractive, 2·04 of resin, 1·38 of tannin, and the remainder woody fibre. I have found in it a large proportion of gallic acid.

Medical properties and uses.—Chimaphila is diuretic and tonic. It has been given successfully in ascites [1], after digitalis and other diuretics had failed; and has also proved serviceable in acute rheumatism, intermittents, and other diseases assuming an intermittent type. It produces an agreeable sensation in the stomach soon after it is swallowed, increases the appetite, and acts powerfully on the kidneys. The urine seems to imbibe the colour of the infusion of the herb, which is that of an infusion of common green tea. The dried herb is best administered in the form of decoction, made with ℥ j. of the plant, including root, stalks, and leaves, cut small and macerated in two pints of water, and then boiled down to one pint, which is to be taken in divided doses within twenty-four hours.

Officinal preparation.—*Decoctum Chimaphilæ*, L.

CINCHONA.[2] *Spec. Plant. Willd.* i. 957.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Cinchonaceæ.

G. 346. *Corolla* funnel-shaped. *Capsule* inferior, two-celled, bipartite, with a parallel partition. *Seed* winged.

* *Corollas downy, with the stamens included.*

Species 1. C. *lancifolia, Mutis. Papel Periodici de Santa Fé,* p. 465. *Rhode. Monog. Cinchonæ Generis Tentamen,* p. 513. *Zea, Annales de Historia Natural.* tom. ii. p. 207.[3] *Flora Peruv.* tom. ii. p. 50. t. 191. *Humboldt, Plantæ Æquinoctiales,* p. 33. t. 10. *Lambert's Description of the Genus Cinchona,* plate 1, ibid. *Illustration of the Genus,* &c. p. 2.

Species 2. C. *oblongifolia, Mutis. Per. de Santa Fé. Zea,* l. c. ii. 211. C. *magnifolia.* C. *lutescens. Flor. Peruv.* ii. 53. t. 196. *Quinologia,* art. vi. 71.

Species 3. C. *cordifolia, Mutis. Per. de Santa Fé. Zea,* l. c. ii. 214. C. *purpurea. Flor. Peruv.* tom. ii. 52. t. 193. C. *ovata, Ruiz, Quinologia.* C. *micrantha. Flor. Peruv.* 62. t. 194. *Lambert.* p. 21. plate ii.[4] *Illustration,* &c. p. 3.

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1 *Medico-Chirurg. Trans.* vol. v. p. 340.

2 Supposed to be named after the Countess del Chinchon, wife of a viceroy of Peru, who introduced it into Europe, on her return to Spain in 1640. The Peruvian name is *Gannanaperide.*

3 Zea adds the following synonymes: *Quinquina,* Condam. A. A. Paris, 1738. C. *officinalis,* Linn. Syst. Veg. ed. 10. p. 929. Spec. Plant. p. 244. Gen. Plant. ed. 7. p. 91. C. *officinalis,* Vahl. Act. Soc. Nat. Haum. 1. fasc. p. 17. t. i. C. *nitida,* Flora Peruv. et Chil. ii. p. 50. t. 191. ; and Ruiz, Quinologia, art ii. 56. C. *lanceolata,* Flora Peruv. 51. C. *glabra,* Ruiz, Quinol. art. iv. 64. C. *rosea,* Flora Peruv. 54. C. *fusca,* Ruiz, Quinol. art. viii. 77.

Besides these synonymes, Zea adds, C. *officinalis,* Linn. Suppl. p. 144. s. v. edit. Persoon, p. 222. C. *pubescens,* Act. Haum. 1. fasc. p. 17. t. 2. This last species was confounded by Linnæus with the *Condaminia,* to which he gave the name *officinalis.*

This important genus, of which twenty-four species have been described, is not yet altogether freed from the ambiguity which has so long involved it; and although much has been effected by the industry of the Spanish botanists, whom their government sent out to make inquiries concerning it, yet many species remain undescribed[1], from which it is very probable the bark-gatherers collect some part of the large cargoes of cinchona bark which are annually sent to Europe. The three kinds designated in the British pharmacopœias have been distinguished and named as above by Mutis, a celebrated botanist, who resided in the neighbourhood of Santa Fé de Bogota, as director of the exportation of bark[2]; and his observations have been fully detailed by his pupil Zea; whilst the travels of Humboldt and Bonpland have afforded them an opportunity of ascertaining accurately, and describing the species first delineated by Condamine in 1738, in the *Mém. de l'Académie*[3], and named by Linnæus *officinalis;* under which term, however, no less than two very distinct species were confounded by that distinguished naturalist. The present edition of the London Pharmacopœia places the three kinds of barks known in the shops as those furnished by three distinct species, namely, C. *lancifolia*, C. *cordifolia*, and C. *oblongifolia;* thus adopting the arrangement and names of Mutis: but the propriety of this is very problematical.

Prior to the year 1772, all the cinchona bark brought to Europe was shipped at the ports of the Pacific; but since Don Jose Celestina Mutis discovered the cinchona about Santa Fé de Bogota much of it has come by the way of Carthagena de Indias to Cadiz.[4] Before describing the officinal

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1 In a large collection of dried specimens of the genus cinchona in my possession, which were collected in 1805, both near Loxa and Santa Fé, I find many species which are not mentioned in the works of any of the Spanish botanists; nor even by Mr. Lambert, to whom I gave specimens of many of the species.

2 Mutis is a native of Cadiz, and went to Santa Fé in 1760, as physician to the viceroy Don Pedro Misia de la Cerda. He discovered the Cinchona, in the forests between Guaduas and Santa Fé, in 1772; although the credit of this discovery was attempted to be wrested from him by Don Sebastian Jose Lopez Ruiz; who, however, from his own documents, transmitted by his brother to Baron Humboldt, to prove the priority of his discovery, appears to have known the Cinchona about Honda only since 1774.

3 Condamine made the first and the only attempt that has been made to bring young cinchona trees alive to Europe. He nursed them for eight months, during a passage of 1200 leagues; but they were washed out of the boat into the sea, and lost near Cape Orange, north of Para.—*Lambert's Illust. of the Genus Cinchona*, 4to. 1821, p. 24.

4 Humboldt informs us, that the quantity of cinchona bark annually exported from America is 12,000 or 14,000 quintals. The kingdom of Santa Fé furnishes 2000 of these, which are sent from Carthagena; 110 are furnished by Loxa; and the provinces of Huamanga, Cuença, and Jaen de Bracamoros, with the thick forests of Guacabamba and Ayavaca, furnish the rest, which is shipped from

species, it is proper to give some account of the geographical distribution of the Cinchonas. Besides the barks of Riobamba and Cuença in Quito, Ayavaca, Huanuco, and Jaen de Bracamoros in Peru, and of New Granada, Cinchona barks have been procured at the northern extremity of South America near Santa Martha, and also as far south as La Paz and Cochabamba, within the viceroyalty of Buenos Ayres, now in the republic of Bolivia: thence the general localities of the true Cinchonas are Peru, Quito, New Granada, and Bolivia. Although the officinal barks are named in the London Pharmacopœia from the form of their leaves, yet, as Humboldt justly remarks, "no tree varies more in the shape of its leaves than the cinchona;" and, in examining dried specimens, he who has not seen them in their native forests, "will be led to discover different species by leaves which are off one and the same branch:" a remark which I am enabled to confirm, by the extensive collection of dried specimens of the genus in my possession. On this account, and for other reasons which shall be stated under the head of each kind, I am of opinion that the best arrangement of the Cinchona barks for medicinal purposes would be that formerly adopted, founded upon the difference of colour, namely *pale*, *yellow*, *red*.

The genus cinchona has been divided by De Candolle into eight genera, namely, *Cinchona*, *Bucna*, *Remijia*, *Exostemma*, *Pinckneya*, *Hymenodyction*, *Luculia*, *Danais*. The diagnostic characters of the genus *Cinchona* are, "the *leaves* opposite, upon short petioles, with flat margins, and ovate or oblong, foliaceous, free, deciduous stipules; *flowers* terminal, in corymbose panicles, of a white or a purplish rose colour."

1. CINCHONA LANCIFOLIA [1], *Mutis. Period. de Santa Fé*, p. 465.

Officinal. CINCHONÆ LANCIFOLIÆ CORTEX, *Lond. Edin. Dub.* Lance-leaved Cinchona. The *Pale* Bark of the shops.[2]

Lima, Guayaquil, Payta, and other ports on the South Sea.—*Plantæ Æquinoc.* p. 34. Perhaps more bark is used in Rome than in any other part of Europe. According to M. Valentin (*Voy. Méd. en Italie*, 1820), 4000 lbs. are consumed annually in the Hospital *Lo Spirito Santo;* and about 10,200 lbs. in the whole city.

[1] Synonymes. C. *nitida*, C. *glabra*, C. *angustifolia*, Ruiz, C. *Condaminia*, Humb. C. *angustifolia*, Ruiz and Pavon. C. *tunita*, Lopez. C. *lanceolata*, Ruiz and Pavon. C. *rosea*, Ruiz and Pavon. C. *Hirsuta*, Ruiz, also yields pale bark.

[2] In the first and second editions of the *Dispensatory*, I regarded this as the yellow bark of the shops; but, in the subsequent editions I conceived that I was mistaken, from my imperfect knowledge of the Spanish language, and the ambiguity of the term *Amarilla*, which may be translated either *pale* or *yellow*. I find, since, that the reviewer of Von Bergen's excellent monographs of the genus *Cinchona*, says, in speaking of the C. *regia*, yellow bark,—"Mutis, Humboldt, and others, derive this bark from the C. *lancifolia*,—Professor Hayne from the C. *cordifolia*."

Syn. Quinquina de Loxa, Quinquina couronne (*F.*), Kron-China, China-rinde, Loxa China, Blasse China (*G.*), China, Kina, China bast (*Dutch*), Kinabark, Chinabark (*Dan.*), Kina, Kinabark, Feberbark, Peruvianisk feberbark (*Swed.*), China (*I.*), Quina de Loxa, Quina de Loxa corona, Cascarilla fina de Uritusinga, Quina Naranjada (*S.*), Quina (*Portug.*), Chinoi karki (*Russ.*), Kwinkinna (*Polish*), Kinna (*Modern Greek*).

This tree is found chiefly in the neighbourhood of the village Ayavaca, at heights from 6250 to 8300 feet, where the mean temperature varies between 59° and 62° of Fahr. on a bottom of micaceous schist, in the woods of Caxanuma, Uritusinga, Villonaco, and Monge. It is a lofty, handsome tree, always in leaf; from thirty to forty-five feet in height, and from one to four feet in diameter, standing generally single[1]; whereas most of the other species are found in groups. It exudes, wherever it is wounded, a yellow astringent juice. The trunk is erect, with a cracked blackish brown or ash-coloured bark; the branches are in opposite pairs, erect, brachiated; with the younger ones obscurely quadrangular at the nodes. The leaves are of a lively green, shining, ovato-lanceolate, about four inches long, with a little pit in the axillas of the nerves on the under surface, which is filled with an astringent, aqueous fluid, and having the orifice shut with hairs: they stand on purplish footstalks one sixth of their length, flat above, and convex below: but the form of the leaf varies according to the altitude at which it grows; particularly before the tree comes into flower. The stipules are two, supra-axillary, acute, silky, contiguous, and caducous. The flowers, which appear in May, June, and July, are odorous, of a pale rose colour, and furnished with little bractes; they appear in terminal, brachiated, leafy, trichotomous panicles, with round peduncles carrying pedicles which are pubescent and silky. The calyx is globular, bell-shaped, five-toothed, pubescent like the pedicles, with the teeth ovate, acute, very short, contiguous and violaceous. The corolla is somewhat salver-shaped, longer than the calyx, with the tube obscurely pentagonous, pubescent, more frequently of a rose colour; the *limb* is rotate with linear lanceolate segments, much shorter than the *tube*, woolly or shaggy on the inside. The anthers are linear, twice the length of the free portion of the filaments, and the free parts of these are two thirds shorter than the adherent.[2] The ovary is globular, changing to an ovate, woody, longitudinally ten-striated, flattish capsule; it supports a filiform style with a bifid stigma. The capsule is crowned with the calycinal teeth, is two-celled, many-seeded, oppositely twice-furrowed, and

1 This solitary character pertains to all the valuable Cinchonas.
2 Humboldt.

opening from the base to the apex with two valves. The seeds are lenticular and winged, or bordered with a rigid membrane.

This tree, or rather its variety, C. *condaminia*, affords the original Cinchona bark of Peru, which is now very rare, 110 quintals only being cut, instead of 4000, which was the quantity cut in 1779: it is reserved for the use of the Spanish government.[1] Zea says it is the *lancifolia* of Mutis, under which we have placed it; and there is also a great affinity between it and the C. *scrobiculata* of Humboldt, according to that celebrated traveller. The bark of the *lancifolia* is the pale bark of the shops, the *Quina Naranjada*[2], *Cascarilla fina de Uritusinga, Quina fina, Quina de Loxa,* and *Q. de Loxa corona* of the Spaniards.[3] It is preferred in South America to all the other cinchonas, and is known to the English by the name of *Loxa* and *Crown bark.* Two other varieties of it, probably produced by distinct species, are also known in commerce by the names of *Lagartijada* (lizard-like), and *Negrilla* (blackish), from the colour of their epidermis.[4] It has always been known in this country by the vague name of Peruvian or officinal bark. The branches are decorticated in the dry season, from September to November, which is the period when all the kinds are barked, and the bark is carefully dried in the sun. The trees frequently die after the operation.

The bark arrives in Europe packed in chests made of slips of wood roughly fastened together, and covered with skins: each chest contains about 200 lbs. weight, well packed, but generally mixed with a quantity of dust and other heterogeneous matter. The pieces are eight or ten inches in length, some of them scarcely one tenth of an inch, others a line in thickness; singly and doubly quilled, or rolled inward, the quills, generally, being in size from a swan's quill to an inch

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1 Estan raro, que apenas corresponde á uno par mil de las ostras especies juntas.—*Ann. de Hist. Nat.* tom. ii. p. 210.

2 This term, orange-coloured bark, might imply a difference from pale bark, but the internal surface is orange-coloured in both varieties.

3 The following are also synonymes of this kind of bark:—

Cascarilla amarilla.	Cascarilla rugosas.
——— de miina.	——— lampiña.
——— boba amarilla.	——— negra.
——— callisalla.	——— palo blanco.
——— crespilla.	——— Cortezon.
——— ahumada de Loxa.	Quina con hojas un poco velludas.
——— angustas.	——— negra de Loxa.
——— poco velludas.	——— tunìta.

4 A pale bark is also known by the name *Silver Huanuco*, the *Quina Huanuco* of the Spaniards, which M. Virey refers to the Cinchona *glandulifera*: but there is reason for doubting the accuracy of this opinion.

in diameter[1]; and others of a coarser texture, thicker and nearly flat.

It has a chopped, grayish, or dull brown or black, or cineritious epidermis, often much covered with lichens[2], chiefly species of *Lecanoræ, Parmeliæ, Strictæ,* and *Collemata;* the latter indicates that the bark is bad. This bark is internally of a pallid fawn or cinnamon hue, sometimes of a dull red tint. This colour is brightened when the bark is moistened, approximating to pale orange. The fracture of the pieces is usually clear, and slightly fibrous within, but in the larger quills it is fibrous. The colour of the powder is a pale fawn. Both the quilled and the flat varieties are evidently the bark of the same tree; the quilled sort being that of the smaller branches, and the flat that of the larger and of the trunk. But the chests probably contain barks obtained from different species of Cinchona. The pale barks are known in commerce under the names *Lima bark, Loxa* or *Crown bark, Jaen bark,* and *Huanidies bark.*[3]

Qualities.—Good bark of this description has scarcely any odour when in substance, but during decoction the odour is sensible, and agreeably aromatic. The taste is bitter, but not unpleasant, slightly acidulous and austere, moderately astringent, resembling in some degree that of a dried rose. It is light, and breaks with a close fracture, with the internal fibres somewhat drawn out. If it separates into fibres when chewed, it is considered to be of an inferior quality. The powder of the quilled kind is paler than the bark, being of an uniform pale cinnamon hue; but the flat kind yields a deeper-coloured and browner powder. The best specimen of this bark which could be procured by me, and subjected to experiment, gave the following results:—Water at 212° degrees extracted all its active principles; affording an infusion, which, when filtered, was of a pale yellow or straw colour, and had the odour and taste of the bark. The infusion reddened litmus paper; was instantly and copiously precipitated by solution of galls; and, in a smaller degree, and more slowly, in yellowish flocculent flakes, by solution of isinglass, gelatine. A solution of tartar emetic was rendered turbid, and slowly precipitated by it;—this effect was quickly and copiously produced on a solution of acetate of lead. Sulphate of iron changes its colour to bright olive-green, but was scarcely precipitated. Decoction afforded a more saturated

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[1] The great desire of our bark merchants to procure quilled bark has induced the bark gatherers often to produce this effect by heat, which always diminishes the virtue of the bark.—*MSS. of Don Felix Devoti of Lima,* in my possession.

[2] On this account the inhabitants of Peru name it *Quinacana,* hairy Quina.

[3] Von Bergen, *Versuch einer Monographie der China,* Hamburgh, 1826.

solution, with a colour resembling the cold infusion of the yellow bark; and a yellowish precipitate was deposited. The powder macerated in sulphuric ether afforded a golden yellow tincture, which reddened litmus paper, and left a pellicle of bitter resin, when it was evaporated, on the surface of water, to which it gave the colour of the tincture. This coloured water had the flavour of the watery infusion; but differed from it, in not precipitating the solution of galls nor that of tartar emetic, and in throwing down a copious precipitate from the solution of sulphate of iron. With alcohol the powder afforded a tincture of a deep orange hue, which precipitated sulphate of iron, tartarized antimony, and infusion of galls; became turbid when added to water, and let fall a light reddish precipitate. From the effects of these re-agents on the aqueous infusion of this bark, it appears to be the same as the 3d and 15th species examined by Vauquelin; which he names *superior gray Cinchona*, and *common Cinchona of Peru.*[1] But these experiments throw no light on the nature of the active principle of this species of cinchona; and it was not until the subject was investigated by MM. Pelletier and Caventou, in 1818, that that principle was ascertained to be an alkaline substance, which has been named *Cinchonia*, combined with a peculiar acid, the Kinic, and a small quantity of Kinate of *Quina.*[2] It is obtained by boiling a pound of bruised pale bark in a gallon of water, previously mixed with six fluid drachms of sulphuric acid. On completing this decoction, the residue should be again boiled with half the quantity of water and acid, and so on until all the soluble matter be extracted. To these decoctions mixed together, slacked quicklime is to be added to saturate fully the acid, and the precipitate, which is a mixture of sulphate of lime and cinchonia, being dried and pulverized, is boiled for some minutes in strong alcohol, which is decanted off whilst it is hot. The residue is again to be boiled in fresh alcohol, and these boilings repeated until the alcohol ceases

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[1] *Annales de Chimie*, lix. 116.—This species is the silver Huanuco, or Lima, erroneously supposed to be the *Quina provinciana*, *Q. Huanuco*, or *Q. Guanuco* of the Spaniards.

[2] None of the kinates can be procured directly from the bark in a crystalline form, but they may be formed by the direct combination of kinic acid with the Cinchonia or Quina; or by the decomposition of the sulphates of these alkalies by means of the kinate of lime. This kinate may be procured by evaporating an infusion of bark to an extract, then treating this with alcohol, until a viscid residue is left, which consists of mucilage and kinate of lime. If an aqueous solution of the viscid residue be made, and evaporated at a gentle heat, crystals of kinate of lime are deposited, and may be purified by a second crystallization. To obtain kinic acid, a solution of the kinate may be decomposed by oxalic acid; the acid remains in solution, and is readily obtained by crystallization, transparent and colourless.

to act on it. By distilling these alcoholic solutions in a retort, until a quantity of solid matter appears on the side of the retort, and small globules of oily matter are seen rolling on the surface of the fluid, the liquid divides into two parts: a bitter milky fluid, which deposits cinchonia on cooling, in the form of impure crystals; the other a viscid substance, which contains cinchonia that may be obtained by converting it into the sulphate, and again decomposing it by lime. It may be also procured by making the decoction with water acidulated with muriatic acid, concentrating the decoction, and digesting with successive portions of slacked lime, until a decided alkaline reaction is apparent. The precipitate then collected, is to be boiled with alcohol. According to Veriton, 1·4 per cent. is obtained; or 80 grains from lb.j. of bark. The quantity of quina does not exceed 0·03. These crystals are purified by dissolving them in boiling alcohol and recrystallization. In this state the crystals are acicular and white, having an intensely bitter taste, and are scarcely soluble in water, requiring 2500 parts at 212°: neither are they very soluble in alcohol, at common temperatures, although they are very soluble in boiling alcohol. They are also soluble in ether and the fixed oils. When heated to 450° in a glass tube, cinchonia fuses like a resin, and on increasing the heat, is decomposed, evolving ammonia, and depositing carbon. It is a compound of 77·81 of carbon, 7·33 hydrogen, 8·87 nitrogen, and 5·9 oxygen: 20 eq. carbon = 122·4 + 12 hydrogen = 12 + 1 nitrogen = 14·15 + 1 oxygen = 8, making its equivalent = 156·55.

Cinchona is also found, in small quantities, in the two other officinal species of bark. Its taste is bitter, accompanied by the flavour of the bark; it neutralizes acids, forming salts, some soluble, others insoluble in water at 60°.

Mutis and Zea regard this species of Cinchona as directly febrifuge; as chiefly applicable in intermittent fevers of long standing; and also assert, that it never fails to cut short an ague when administered at its accession.[1]

2. CINCHONA OBLONGIFOLIA. *Mutis.*[2]

Officinal. CINCHONA OBLONGIFOLIÆ CORTEX, *Lond. Edin. Dub.* Oblong-leaved Cinchona Bark. Red Bark.

Syn. Quinquina rouge (*F.*), Rothe Chinarinde (*G.*), China (*I.*), Quina roxa, Quina colorada (*S.*), Quina Vermetha (*Portug.*).

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[1] *Annal. de Historia Natural.* ii. 609

[2] *Synonymes.* C *magnifolia,* Flor. Peruv., which is found to the south of the equator, on the mountains of Panatahuas, near Cuchero, Chinchao, and Chacahnassi. Lambert denies its affinity with *magnifolia.* See *Illustration,* &c. p. 12.; but from the specimens in my possession I cannot admit this opinion Von Bergen is of opinion that the species furnishing the *red bark* is not yet ascertained.

The tree yielding this bark is the largest of the genus: it is found on the Andes, growing in the woods on the banks of the mountain streams in great abundance, at Riobamba, Chinchao, Cuchero, and Chacahnassi; flowering in June and July. It was discovered by Mutis near Marimita, in 4° North lat., at an elevation of 4000 to 8500 feet. It rises to a very considerable height on a single erect, round stem, which is covered with smooth, brownish ash-coloured bark. The older branches are round, smooth, and of a rusty colour; the younger are obtusely four-cornered, leafy, and of a diluted reddish colour. The leaves are opposite, large, the full-sized ones being one or two feet in length, of an oblong oval shape, and supported on short, semi-round, purple petioles. They are entire, pale, and shining on the upper surface; on the under marked with veins that turn to a purplish colour: and at the base of each are numerous bundles of white bristles: the stipules are supra-axillary, interfoliaceous, opposite, contiguous, united at the base, and of an obovate figure. The flowers appear in large, erect, much compounded, terminal, corymbose panicles, somewhat branched, on brachiated, many-flowered peduncles: the calyx is small, five-toothed, and of a purple colour; the corolla white and odorous, with the limb spreading, and hairy within; the filaments are very short, inserted into the tube of the corolla, supporting oblong anthers three times the length of the filaments, bifid at the base, and situated below the middle of the tube of the corolla. The capsules are large, ovate, obscurely striated, slightly curved, and crowned with the calyx.[1]

The tree is named in the vernacular Spanish, *Palo de requeson*, and *Cascarilla de flor de Azahar*, from the flowers resembling in odour those of the orange. Its bark is the *Quina Roxa*, and has been supposed to be the *Cascarilla colorada* of commerce; but there is reason for thinking that this opinion is incorrect.[2] The bark of C. *oblongifolia* is certainly not the red bark known as such in this country. Von Bergen has satisfactorily proved that the bark of C. *oblongifolia* bears no resemblance to the ordinary red bark; and both Ruiz and Pavon acknowledge that they are ignorant of its source, but that it is very different from the red bark of Santa Fé, which is that of the C. *oblongifolia*, and contains little of either of the alkaloids, on which the goodness of the Cinchona barks depends. It was supposed by Condamine to be the bark of the

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1 *Flora Peruv.* ii. 53. t. 196.

2 The other synonymes of this kind are the following:—

Cascarilla mariquita de Loxa.

——— del rey.

——— roxa verdadera Huanuco.

larger branches of the same tree which yields the pale bark. The genuine red bark is brought to this country from Peru, in chests, which contain from 100 to 160 lbs. each; never in seronnes. It consists of various sized pieces, covered with a thin and rough, entire, reddish-brown epidermis, with wavy, longitudinal wrinkles, occasionally elevated into oblong warts, friable, and of a granular consistence. In some instances, the epidermis is covered with whitish gray lichens.[1] The greater number of the pieces are flat, but some are partially quilled, as if taken from half the circumference of the branches to which they belong. Under the epidermis, which is of a rust-grey hue, and cracked with furrows almost penetrating to the bark, there is an intermediate layer, which is dark-coloured or brownish-red, compact, brittle, and seemingly resinous, but less bitter than the inner bark: and within it the internal part is woody, fibrous, and of a rust-red, sometimes yellowish colour. The fracture, examined by a lens, consists of close, longitudinal, parallel, needle-form fibrillæ of pale red or red fawn colour, with a deep red agglomerated powder in the interstices. The powder is of a deeper colour than the internal part of the bark, namely, a dull brownish-red hue.

Qualities.—Red cinchona bark has a weak peculiar odour, not unlike that of tan, or earthy; and its taste is bitter and slightly aromatic, but more austere than that of the barks of the other species. The aqueous infusion has a pale ruby colour, a slight degree of bitterness, and a decided astringency. It lets fall a sediment of a brighter hue than that of the dry powder. It reddens litmus paper[2], is slowly precipitated by the solution of galls, the supernatant liquor being perfectly colourless; and a very light, flocculent, ruby-coloured precipitate is produced by the solution of gelatine. It is scarcely altered by tartarized antimony, more so by the acetate of lead: the protosulphate of iron makes it assume a deep olive-green colour, but little is precipitated. The ethereal tincture is of the same colour, and exhibits the same appearances, as that of the former species, when treated in a similar manner. The alcoholic is of a very deep brownish-red colour; when diluted with water, a red flocculent matter falls down; and it precipitates the solutions of sulphate of iron, and of tartarized antimony, the former of a black colour, and the latter red. Its virtues depend on two alkaline substances; one the *cinchonia* already

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[1] Guibourt divides the red barks into quinquina rouge verruqueux and q. rouge non verruqueux.

[2] Fourcroy found in it a portion of citric acid, some muriate of ammonia, and muriate of lime.

described, the other *quina*, about to be described in the account of the next species; and both are combined with kinic acid;—the *cinchonia* is in greater quantity than the *quina.*

According to the experiments of Pfaff, many specimens afford only 1·7 per cent. of cinchonia, and 0·44 of sulphate of quina; others so much as 3·17 of the former, and 0·15 of the latter. Pelletier and Caventou found 0·8 of cinchonia, and 1·7 of quina![1]

This bark was intoduced by Don Sebastian Josef Lopez Ruiz, in 1778[2]; and is considered by Zea and Mutis as the least directly febrifuge of the three kinds which are described in this work. It possesses powerful astringent properties; consequently its use is contra-indicated in inflammatory and bilious affections: but the Spanish physicians regard it as highly beneficial as an external application in suppurating and sphacelating ulcers. An extract prepared from it is much used in Spain, in putrid fevers.

3. CINCHONA CORDIFOLIA. *Mutis.*[3]

Officinal. CINCHONÆ CORDIFOLIÆ CORTEX, *Lond. Edin. Dub.*
Heart-leaved Cinchona. The Yellow Bark of the shops.

Syn. Quinquina jaune, Quinquina Calisaya (*F.*), Gelbe Chinarinde, Rieberrinde, Königs-China (*G.*), Gul Kinabark (*Swed.*), China (*I.*), Quina amarilla (*S.*).

This source of yellow bark is far from being certain. Mutis affirms that it is the produce of *C. lancifolia.*[4] It is the produce of Bolivia in Upper Peru, and the province of La Paz. It is exported from Buenos Ayres, as well as from Lima. The tree which is said to afford this bark in the British pharmacopœias is found on the mountains of Loxa, in the kingdom of Quito, and those of Santa Fé de Bogota, growing along their skirts, and on the plains, under the 4th degree of north latitude, on heights betwixt 900 and 1440 toises; flowering from May to September. It is a spreading tree, rising fifteen to twenty feet high, on a single, erect, round stem of no great thickness; and covered with a smooth bark, externally of a brownish-grey colour. The younger branches are quadrangular, smooth, leafy, sulcated, and tomentose: the leaves, which are about nine inches in length, are opposite, petiolate, spreading, of an oblong oval, cordate or egg-shape, entire, shining on the upper

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[1] *Geiger.*

[2] From some remarks of Ruiz, there is reason for thinking that the red bark is the bark of the same tree which yields the pale bark, but taken from larger branches.

[3] *Synonymes.* C. *pubescens*, Vahl. C. *ovata*, Flor. Peruv. C. *hirsuta*, Flor. Peruv. But Lambert affirms that it is totally different from the C. *hirsuta* of the Flora Peruviana. See *Illustrations of the Genus Cinchona*, 4to. 1821, p. 4.

[4] *Lambert's Illustrations*, p. 53.

surface, ribbed and pubescent on the under; with the petioles flat on one side, and roundish on the other, about a thumb's breadth in length, and of a purple colour; but the leaves of the species vary even more than those of *C. lancifolia.* The flowers appear in large terminal, brachiate, leafy panicles, supported on long, compressed, tetragonous peduncles. The calyx is five-toothed, downy, and of a dull purple colour: the corolla internally tomentose; the tube of a diluted red colour; the limbs shaggy, white above and purplish below; and the segments spreading, with reflected tips. The filaments are short, supporting linear anthers, bifid at the base, which reach as far as the upper part of the tube of the corolla. The germen is tomentose, and changes to an oblong narrow capsule, about one inch and a half in length, marked with ten striæ, of a reddish-brown colour, and crowned with the calyx.

The bark yielded by this tree is named *Quina amarilla*[1], *Cascarilla de Loxa*, and *Cascarilla amarilla;* but it is not the *Calisaya*, the yellow bark of the shops, which is not brought from Carthagena, but from ports in the Pacific Ocean. The genuine yellow bark is the *Calisaya arrollada* of the Spaniards, the synonymes of which are *Calisaya de plancha, de Quito, de Lima.*[2] It is brought to this country in chests, containing about 90 lbs. to 100 lbs. each; and consists of pieces about eight or ten inches or more in length, some quilled, but the greater part flat.[3] The quilled pieces are less rolled and much thicker than the quilled pale bark; and the epidermis, which is of a tawny, greyish-brown colour, and covered with flat and stringy lichens, is more rough and chopped, easily separating, and often as thick as the bark itself, which is about one eighth of an inch; while the interior is of a yellow colour, passing to orange. The flat pieces are generally without any epidermis, and considerably thicker than the quilled, and of the same yellow hue without and within. Both are mixed in the same chest. The epidermis yields a dark-red powder, which is tasteless and inert.

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[1] *Yellow bark;* but the adjective signifies both yellow and pale or wan. The name appears to be used in contradistinction to *naranjada*, orange-colour, which is applied to the first officinal species. Additional synonymes:

Cascarilla delgada.
———— palo blanco.
Quina amarilla de Bogota.

[2] The name *Calisaya* is that of a province producing this bark, in the most southern part of Peru, in the Intendencia de la Paz. There are three varieties of Calisaya known in South American commerce: 1. *Calisaya arrollada,* rolled Calisaya; 2. *Calisaya de plancha,* flat Calisaya; 3. *Calisaya de Santa Fé,* which is also a thick, flat bark.—*MSS. of Dr. Devoti.*

[3] These are distinguished in commerce by the terms *with coat* and *without coat.*

Qualities.—Yellow bark has nearly the same odour in decoction as the pale; the taste is more bitter, but less austere, and it does not afford any astringent feeling to the tongue when chewed. The internal colour is golden cinnamon, or subdued orange-yellow, becoming when moistened a lively orange. The fracture is woody and fibrous, presenting, when examined by a lens, the appearance of parallel, longitudinal, needle-like fibres, with a dry agglomerated powder in the interstices, of a yellow colour. It is easily reduced to fine powder, and the powder preserves the colour of the bark, but is brighter. Guibourt has proposed the following method of distinguishing this bark when in quill from red bark. Pulverize a little of the bark, and triturate the powder in a porcelain mortar with water, and filter; then to the filtered fluid add some crystals of pure sulphate of soda: a white precipitate will be thrown down if the specimen be true yellow bark. The sediment, which the infusion lets fall in cooling, is of a brighter colour than the dry powder. The filtered aqueous infusion has a pale golden hue, with a shade of red; is clearer, and seemingly less mucilaginous, than the former: it has all the bitterness of the bark; reddens litmus paper, and precipitates solution of galls; but the precipitate does not fall so instantaneously as in the infusion of the former species. With solution of gelatine a pinkish yellow precipitate is produced: acetate of lead throws down a precipitate; and tartarized antimony, one more copious than that which the pale bark affords. A solution of sulphate of iron changes its colour to a bluish green, and, after many hours, gives a precipitate of the same hue. The ethereal tincture has a golden colour, affords resin when evaporated, and is affected by the same re-agents as that of the pale cinchona; but the water on which it is evaporated is less highly coloured. The alcoholic tincture appears to be in every respect the same as that afforded by the pale bark. It seems to agree in most of its properties with the first species examined by Vauquelin; which he states was brought to Spain in 1788, and, owing to its having been used for the royal family, got the name of royal cinchona. Yellow bark owes its febrifuge properties to an alkali which has been termed *Quina*, and which can be separated by a process similar to that employed for obtaining cinchonia. *Quina* separates from the alcoholic solution in a viscid state, and when dried in the open air, in a moderate heat, becomes brown and brittle. Thiel procured from the flat bark 2·3 per cent. of *Quina*, and 0·08 of *Cinchonia:* Michaelis procured no *Cinchonia*, but 3·7 per cent. of *Quina* from the flat, and 2·0 from the quilled: Von Santen, 2·0 of *Quina* from the flat, with a trace of *Cinchonia:* Witstock obtained 3·0 per cent. of *sulphate of Quina*, and 0·12 of *Cinchonia.*[1] When properly prepared Quina is white, bitter, insoluble in water, but very soluble in ether. Its proximate principles are 75·76 of carbon, 7·52 hydrogen, 8·11 nitrogen, and 8·61 of oxygen[2]: or 20 eq. of Carbon = 122·4 + 12 Hydrogen = 12 + 1 Nitrogen = 14·15 + 2 Oxygen = 16, making its equivalent 154·5.

All the cinchonas are mountainous trees, growing seldom lower than 975 toises above the level of the sea. Those are richest in the alkaloids which are found in the most elevated situations: the Cinchonas of Peru are generally the richest in Cinchonia; those of Bolivia and La Paz in Quina. Those species, the corolla of which is downy and pink, furnish the largest quantity of the alkaloids: those which have smooth and white corollas, the smallest quantity. No inference can be drawn from the smooth or downy character of the leaves.[3]

The goodness of all the species of Cinchona depends on the proper age of the branches that are barked. The bark-collectors (*cascarilleros*) decide on the maturity of these in the following manner:—They strip off from each branch a small piece of bark; and if it immediately redden on the inner side, they consider it sufficiently mature; but should the colour not appear in three or four minutes, it is rejected as being not yet in season.[4] As the trees frequently die after being barked, and no new ones are planted, there is reason for fearing that this valuable drug may ere long be lost to Europe.

Cinchona bark occasionally varies in its powers, and is often mixed with other inferior barks, even by the bark peelers (*cascarilleros*) who gather it. This arises either from ignorance, or from a fraudulent desire of more quickly completing their contracts[5]; it is, therefore, of importance to be able to distinguish good bark, and the best varieties from those of an inferior description. Mutis informs us, that the old trees furnish the best bark; and that the bark taken from the trunk and thicker branches is superior to that from the younger branches. The following directions for choosing bark are those generally attended to in South America[6]:—The essential

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1 *Geiger.* 2 *Sieberg.*

3 The Carthagena barks; namely, C. *cordifolia* of Mutis, C. *oblongifolia*, *brown Carthagena bark*, and the bark of *Santa Martha*, contain less of the alkaloids than the Peruvian barks.

4 *Memoir on Quinquina, by M. Laubert, Chief Physician to the Spanish Army:* translated in *Lambert's Illustrations*, 4to. 1821, p. 64.

5 Humboldt says, "We saw at Peru the barks of two new species of Weinmannia and Wintera mixed with those of Cinchona." *Personal Narrative*, vol. v. p. 769. *Trans.*

6 Extracted from a MS. of *Don Felix Devoti*, a respectable physician at Lima, who had practised upwards of twenty-five years in South America.

characteristics are *colour*, *taste*, and *smell:* the secondary, or accidental ones, are *exterior coat*, *fracture*, *weight*, *thickness*, and *quill.* The best yellow bark is of an orange-yellow colour; and the goodness decreases as the colour varies from this to a very pale yellow. When of a dark colour, between red and yellow, it is always to be rejected; as this colour designates either that it is of a bad species, or that it has not been well preserved from the air and moisture. This dark colour, however, must not be confounded with a red colour in the inside, which constitutes a distinct species. The *taste* of bark should be bitter, but not nauseous nor very astringent, with a slight agreeable acidity just perceptible to the palate; and, when chewed, it should not appear in threads of much length. The *odour* of any of the barks is not very strong: but, when they have been well cured and preserved, it is always perceptible; and the stronger it is, provided it be pleasant, the better may the bark be considered. The appearance of the *coat* or epidermis has led to mistakes. It is, in many instances, merely accidental; depending on the variation in the height of the ground, and the exposure of the branches to the sun and air. Seven distinct appearances of the epidermis are remarked; 1. Negrilla, Dark silver coat[1]; 2. Crespilla, short curled; 3. Pardo-obscura, dark open leopard grey[2]; 4. Pardo-clara, light open grey[3]; 5. Lagartijada, fine dark silver, lizard-coloured[4]; 6. Blanquissima, very pale[5]; and, 7. Cenicienta, ash-coloured. The first three are the best, and belong to bark produced on the highest mountains; the others rank in the order of their arrangement; the epidermis being always cracked and rough in proportion as the trees have been exposed to a scorching sun. With regard to *fracture*, some of the worst barks break even and clean as if cut with a knife, and some of the best have always a more or less splintery fracture.[6] The fibres of the fracture being sharp and short, indicate the bark to have been gathered from mature branches; the long and thread-like from immature branches. The best barks are generally observed to be the heaviest. In point of *thickness*, very thin bark is inert, owing to the branches from

[1] This bark is occasionally found amongst the pale cinchona sent to England. It is easily distinguished by its spotted surface. Ruiz says it must be ranked among those of a middling quality.

[2] This is found mixed with the pale bark of the shops. It is regarded as of middling quality.

[3] This is a very rare bark, and is that of the C. *fusca* of Ruiz. It is called *Asmonich* by the natives of Puzuzu and Muna, where it is found.

[4] The bark with this coat has the greatest affinity with the *yellow* bark of the shops. It is a good kind of bark.

[5] This bark is little valued in Spain, and is seldom met with in commerce.

[6] The idea of a resinous fracture being the characteristic of good bark originated when the virtue of bark was supposed to depend on the resin it contained.

which it was taken having been too young; and very thick bark, particularly if it break like common wood, argues that the tree must have been sickly; yet bark exceeding a line in thickness may be good: for although it is disapproved of at Cadiz, under the name of *quinon*, yet excellent effects have resulted from much thicker bark in England. The moderately thick and firm bark is always preferred at Lima. The *quilling* of bark arises from the manner in which it is separated from the branches. This is effected by making a longitudinal incision in the branch, and passing under the bark a very fine knife. As the slip dries, it rolls up, owing to the internal surface shrinking more than the external: a feeble rolling, therefore, denotes that the bark is rather too old, or has been too slowly dried; too much quilling, that it is either too young, or has been too hastily dried. The moderate *quill* of bark certainly denotes it to be of the best kind, and that it has been taken from branches of a proper age, and well dried; but the bark-collectors often produce this effect by fire, when there is a want of sun, as is frequently the case in some parts of the mountains. The fraud is known by the colour being much darker; and, when the bark is split, the inside exhibiting stripes of a whitish sickly hue. It should be preserved in cases, well secured from the air and humidity.

Analytical examinations of cinchona.—These have been made with the view of discovering on what principle its febrifuge properties depend, and chymists well qualified for the task have engaged in it. In giving a short history of their trials, we need not go further back than Vauquelin: he divided all the different species into three sections, according to their chymical properties.[1] The first comprised those which precipitate tannin, but not animal gelatine; the second, those which precipitate gelatine, but not tannin; and the third, those which precipitate at the same time tannin, gelatine, and tartar emetic. He conjectured, that on the principles producing these effects, particularly that which precipitates infusion of galls, the febrifuge properties of the barks depend, and that they are more or less febrifuge, in proportion to the quantity of these principles that are present. He asserted that the principle which precipitates tannin is of a brown colour and bitter taste; is less soluble in water than in alcohol; and that it also precipitates tartarized antimony, but not glue.[2] He imagined that it possessed some analogies

[1] He examined seventeen different kinds, but was not able to ascertain the names of the trees from which they were obtained.

[2] The effect of this principle was first noticed by Dr. Maton; and soon after by Seguin, who immediately concluded that it was gelatine; but this opinion was proved to be erroneous by Dr. Duncan, jun., who found that it was a principle sui generis, and named it *cinchonin*. Vide *Nicholson's Journal*, vii. 226.

with the resinous bodies, although it furnished ammonia on distillation; whilst the principle which, in some cinchonas, precipitates glue, has a bitter and astringent taste; is more soluble in water than the principle which, in other kinds, precipitates tan: it is also soluble in alcohol, and does not precipitate tartar emetic.[1] Reuss of Moscow, along with a red matter, which he named *cinchonic red*, procured a bitter principle, probably *Quina;* but its nature was not ascertained. Dr. Duncan, jun., supposed that the precipitate formed with infusion of galls was a peculiar vegetable principle, and named it *Cinchonin:* and Dr. Gomez of Portugal afterwards verified this supposition by procuring it in crystals, by acting upon the aqueous infusion and the alcoholic extract of pale bark, with *Liq. Potassæ;* he regarded it as analogous to resin. Laubert also, who procured it by another process, regarded it as *white resin.* Fabroni conceived that he was authorised in concluding from his experiments, that "the febrifuge virtue does not belong essentially and individually to the astringent, the bitter, or any other soluble principle, as the quantity of these increases by long boiling, while the virtues of the decoction decrease. He also contended that the febrifuge virtue does not reside in that principle which destroys the emetic property of tartarized antimony, and precipitates iron, since the decoction contains more of it than the infusion, while its virtues are evidently less."[2] It was concluded from these doubts, and many others that had been raised, that much was yet to be done before the principle of cinchonas effective in the cure of fevers could be ascertained, and time has displayed the truth of this opinion.[3]

The analyses of the cinchona barks which first developed their active principles are those of MM. Pelletier and Caventou. The following are the components of the three officinal species:—1. In *pale bark*, and also in all the species, is found, first, *kinic* acid, combined with the *cinchonia*, forming an

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[1] *Annales de Chimie*, l. c.

[2] *Edinburgh Medical and Surgical Review*, ii. 338.

[3] In consequence of a chymical theory of the mode in which cinchona acts on the living body, Fabroni made some curious experiments to ascertain the relative affinity of different cinchonas to oxygen. In imitating his experiments with the three officinal species, I found that, when half a drachm of each of these barks in powder was separately mixed with half a fluid ounce of strong nitric acid, in similar vessels, the temperature of the atmosphere at the time being 70°, and that of the acid 71°, in the space of four minutes, the heat produced raised the mercury in the thermometer as follows:

Common pale bark,	—to 120°
——— yellow bark,	—to 123°
——— red bark,	—to 119°

The mixture in each vessel was gradually swollen as the heat increased, and nitrous fumes were given out, showing the evident decomposition of the acid.

acidulous kinate of cinchona; second, a green fatty matter, first detected by Laubert; third, a red, nearly insoluble colouring matter, which is termed red cinchonic, discovered by Reuss; fourth, tannin; fifth, a yellow colouring matter, detected by Laubert; sixth, kinate of lime; seventh, gum; eighth, starch; and ninth, woody fibre. 2. In *yellow bark*, the acid is combined with quina, and a small proportion of cinchonia. That former alkaline base was found to be very soluble in ether, and to form salts with the acids different from those formed by cinchonia. The components of yellow bark are, acidulous kinates of quina and cinchonia, a deep yellow fatty matter, red cinchonic, tannin, yellow colouring matter, kinate of lime, starch, and woody fibre. 3. *Red bark* contains acidulous kinates of cinchonia and of quina in a large quantity, reddish fatty matter, red cinchonic, tannin, kinate of lime, yellow colouring matter, starch, and woody fibre.

According to my own experiments, the following are the known constituents of the officinal cinchonas: *Cinchonia* or *quina*[1], according to the species of bark analysed, united with the *kinic acid*[2], *kinate of lime*, *resin*, *red cinchonic*, *fecula*, *yellow colouring matter*, *gluten* or *ferment*, *volatile oil*[3], and *tannin*. I separated the *resin* in a pure state by evaporating the ethereal tincture on the surface of cold water; and the *gluten*, as Fabroni also found it, was separable by water, occasioning the spontaneous fermentation of the decoction and infusion in summer, and decomposible by fermentation. MM. Alibert and Cabal demonstrated the presence of iron in cinchona, by incinerating the bark, dissolving the ashes in nitric acid, and adding ferro-cyanate of potassa, which precipitated prussian blue.

The two alkaline bodies *cinchonia* and *quina*, found in these barks, unite readily with the acids, particularly the sulphuric; and their sulphates are now generally employed instead of entire barks or their other preparations.

The *sulphate of cinchonia* is so little employed, on account of the expense of preparing it, that I shall here describe its

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1 The ultimate components of these alkaloids, according to Pelletier and Dumas, are:—

		Cinchonia.	*Quina.*
Carbon	-	76·97	74·14
Oxygen	-	7·97	6·77
Hydrogen	-	6·22	8·80
Nitrogen	-	9·02	10·76
		100·18	100·47

2 *Annales de Chimie*, lix. l. c. The name of the acid is derived from *kina kina*, an old appellation of the bark. Dr. Duncan proposes to call it *cinchonic acid*, as the present name would lead to the supposition that it is procured from kino.

3 Dr. Irwin first obtained a small portion of this oil.

characters and composition: it is obtained in the same way as ordered in the pharmacopœia for preparing the *sulphate of quina.* It crystallizes in short white six-sided prisms, derived from an oblique rhomboidal prism. The prisms are often aggregate. They are soluble in 6·5 of alcohol of sp. gr. 85., and in 54 parts of water at a temperature of 60° Fahr. According to M. Beaup's experiments, these crystals consist of cinchona 84·324, sulphuric acid 10·811, and water 4·865, or of one atom of cinchonia = 156·55, + one of acid = 40·1, + four atoms of water = 36; making the equivalent 242·65.[1] They effloresce in dry air. A disulphate is also formed less soluble than the sulphate.

The *sulphate of quina* is now prepared according to a process of the London College. (*See Part.* iii.)

It has been supposed by Robiquet that the colouring matters of the barks act in some degree as acids: these are *red cinchonic*, and the *yellow colouring matter.* The former is insipid, inodorous, insoluble in water, very soluble in hot alcohol, nearly insoluble in ether. It precipitates tartar emetic, but not gelatine. It is thrown down by diacetate of lead. The yellow colouring matter is nearly tasteless, is soluble in water, alcohol and ether, precipitates neither tartar emetic nor gelatine: but it is precipitated by diacetate of lead. The *red soluble matter* is tannic acid.

Medical properties and uses.—Cinchona bark is a powerful and permanent tonic, possessing also antiseptic powers; and is, undoubtedly, superior to all other remedies in counteracting febrile action, and restoring strength and vigour to morbidly weakened habits.

The stories which are related regarding the discovery of its febrifuge powers appear to be founded on fiction, and are unworthy of notice. The Peruvians, it has been supposed, were acquainted with its powers before the conquest of their country by the Spaniards, and from them the knowledge of it might have been acquired by their conquerors: and this supposition is supported by Ruiz and Pavon: but Humboldt renders it improbable, and says, that the use of the cinchona bark "is entirely unknown to the Indians in Loxa, Guaneabamba, and far around."[2] They even regard it as poisonous; and "in Malacatis only, where many bark-peelers live, they begin to put confidence in the cinchona bark."[3]

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[1] *Ann. de Chimie,* xxvii. p. 323.

[2] *Humboldt on the Cinchona Forests;* in *Lambert's Illustrations of the Genus Cinchona.* Lond. 1821. 4to. p. 22.

[3] Humboldt says that the present people of South America have the most inveterate prejudices against the employment of the different kinds of cinchona; and

The most probable history of the discovery of the febrifuge virtues of cinchona is the following tradition, mentioned by Humboldt, in his Dissertation on the Cinchona Forests. The Jesuits, at the felling of the wood, had taken notice of the considerable bitterness of the cinchona, and "there being always medical practitioners among the missionaries, it is said they had tried an infusion of the cinchona in the tertian ague, a complaint which is very common in that part of the country;" and having found it succeed in curing the disease, began to employ it as a febrifuge.

It was probably brought into Europe in 1632; at least so asserts Sebastian Badius, a Genoese physician, on the authority of D. Jos. Villerobel[1]; but it was, nevertheless, little known by Europeans, until the Countess of Cinchon, wife of Don Geronimo Fernandez de Cabrera Bobadella y Mendoza, Count of Cinchon, viceroy of Peru, who had been cured by it in 1638, recommended it, on her return to Spain, in 1640. Its fame soon spread, and it was taken to Italy in 1649[2], and through the means of Cardinal de Lugo and the Jesuits was distributed over the Continent.[3] It was in repute in England in 1658: but owing to its high price[4], and some prejudices formed against it, it was very little used, till Talbot, an Englishman, again brought it into vogue by the many cures he performed with it in France, under the name of the *English remedy.*[5] His secret of preparing and exhibiting it was purchased by Louis XIV. and made public. These circumstances throw light on the origin of some of the names by which it has been known; as *Cortex* and *Pulvis Comitissæ; Cortex* and *Pulvis de Lugo; Pulvis Jesuiticus* or *Pulvis Patrum; Arbol de la Cascarilla; Cascarilla della Oja; China, Corteza de Loxa;*

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in the very country where this valuable remedy grows, they try to cut off the fever by infusions of Scoparia *dulcis,* and hot lemonades prepared with sugar and the small wild lime, the rind of which is equally oily and aromatic. *Personal Narrative,* vol. v. p. 164. *Trans.*

[1] Sebastianus Badius, Anastasis corticis Peruviani, seu kina kina defensio contra Chifletium et Plempium. Genuæ, 1663.

[2] The earliest printed treatise on the medical properties of Peruvian bark, with the exception of the *Schedion,* an Italian handbill printed in 1649, recommending it, and giving directions for exhibiting it, is that of *Joannes Jacobus Chifletius,* entitled "*Pulvis Febrifugus Orbis Americani.*" 4to. pp. 30. Anno 1653. Chifletius was physician to the Archduke Leopold William.

[3] Morton gives the above account on the authority of Bollus, a Genoese merchant, who had lived long in Peru, "autor fide dignus." *De Febribus Intermit.* c. vii.

[4] It was sold at first by the Jesuits for its weight in silver; and at Brussels, in 1658, twenty doses of the powder were sold for sixty florins, to be sent to Paris (*Strumii Feb. Peruv. Vind.* Antwerp. 1659); yet Condamine relates that, in 1690, several thousand pounds of it lay at Piura and Payta for want of a purchaser. *Mémoires Acad. Roy.* 1738.

[5] Talbot is noticed by Fontaine in his *Poëme du Quinquina,* for having cured the Prince of Condé and the minister Colbert with the bark.

Cortex China de China, and *Gentiana Indica.* It was called also, *Palo de Calenturas*, *Lignum Febrium*, *Fieberholz*, *Bois des Fièvres*, *Cortex Antiquartius*, *Corteccia della Febbre*, *le Poudre de Talbot*, and fever wood, on account of its effects; and, from the place whence it was brought, *Peruvian Bark.*

It was introduced into practice for the cure of intermittent fever. It was much opposed at first[1], but soon acquired great reputation; and it still retains the reputation it acquired as a remedy for that disease; although, owing to peculiar idiosyncrasies and other accidental causes, it has occasionally failed in this country in agues, which were afterwards removed by other remedies, particularly arsenious acid. Some of these failures may, perhaps, have arisen from the kind of bark employed: for notwithstanding the generally received opinion, that all the kinds of bark may be indifferently used, one for another, yet there is some reason for the assertions of the Spanish and the American physicians, that they vary in other respects besides their degree of activity. By them the pale bark, *calisaya*, *quina*, *naranjada*[2], is considered as directly febrifuge, and the best adapted for the cure of the ague; the yellow bark, *quina amarilla*, as only indirectly so, and better fitted for slow fevers and chronic debilities: while the red, *colorada*, *quina roxa*, is only fit to be used in cases of gangrene[3], as its use is apt to be followed with disgustful nausea, severe vomiting, and insupportable colic.. The physiological influence of Cinchona is that of a topical stimulant, and a general tonic. When taken into the stomach it excites, soon afterwards, a moderate sensation of warmth at the epigastrium; and if the dose be large, nausea and vomiting sometimes follow; and purging is not an uncommon result of its administration. Its influence upon the vascular system is soon also obvious by the pulse increasing

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[1] Among others, it was opposed by Chifletius in the work already noticed, owing to the time in which it was administered to his patron, the Archduke, preventing it from proving beneficial. This time was that ordered in the Schedion, "frigore febrili incipiente." It was opposed also in a tract, published in 1655, in defence of Chifletius, by Melippus Protimus*, against one Honoratius Fabri, a French Jesuit, who called himself Antimus Conygius, and had ventured to extol the bark. It met with many opponents in England, also, from Alderman Underwood having died while using it, in 1658, and his death having been ascribed to the bark.

[2] According to Condamine, this was the bark first introduced into Europe. He says it yields by incision a yellow odorous resin; and that the Jesuits of La Paz (whence the best bark of this species is still obtained) used to gather it with care, and send it to Rome, where it was specific in agues. But the Loxa bark coming to Europe soon after, the three kinds were confounded together.

[3] Zea, *Annales de Hist. Nat.* l. c. Rushworth discovered the efficacy of the red bark in gangrene.

* Protimus was a feigned name; it was Vopiscus Fortunatus Plempius.

both in frequency and in force; whilst, at the same time, the nervous system evinces that it is under its action by a sensation of tension and slight fulness in the head; sometimes with singing in the ears, and partial deafness. As an antiperiodic, its influence is displayed by its breaking the catenation of morbid symptoms which constitute the paroxysm of ague: but the manner in which this is effected is still involved in obscurity.

In intermittent fever the remedial influence of Cinchona has long been undoubted. Some differences of opinion existed with regard to the best time of giving it, but these are now nearly settled. It was originally given in doses of ʒ ij. immediately on the attack of the paroxysms. Boerhaave[1] and others recommended that the fever should be allowed to run on for some time before it was administered; but a better practice is to give it as early as possible after the stomach and bowels are cleared by an emetic and cathartic. Sydenham first proposed to administer it in the intervals instead of during the paroxysms. Dr. Cullen recommended the exhibition of it in a large dose or doses immediately before the accessions[2]: but Morton's method of giving it directly after the hot stage of the paroxysm ceases, and repeating it in increased doses during the intermission, until the cold stage again returns, is generally adopted. It may be safely given, however, during the paroxysm, as practised by Dr. Clarke of Newcastle, but many stomachs are apt to nauseate it at that time. It has also been found equally efficacious in other diseases; namely, intermittent hemicrania; dysentery, and diarrhœa, when they become intermittent; chorea, epilepsy, some coughs, and rheumatism: indeed I have long regarded it as a maxim, that wherever intermission clearly takes place, there cinchona or its preparations will prove useful: but it does not prevent the continuance of those paroxysms of ague which form one of the constitutional symptoms of stricture of the urethra, and some other local affections; and which can be cured only by removing the strictures and other sources of irritation. The yellow bark possesses the most powerful antiperiodic powers.

In remittent fevers, cinchona is also found beneficial; but the excitement, particularly in the remittents of warm climates, requires to be previously subdued by blood-letting, and the bowels to be kept open. It renders the remissions distinct, and by degrees checks altogether the febrile action.

In the low stage of continued fevers of the typhoid type, particularly when these are attended with symptoms of pu-

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[1] *Aphorismi*, &c. 767. [2] *Mat. Med.* ii. 97.

tridity, as in gaol-fever, cynanche maligna, scarlatina maligna, confluent small-pox, and in putrid measles, bark must be regarded as one of the most valuable remedies. The administration of it in pure typhus has been of late years judiciously delayed until the increased excitement is presumed to be subdued, and symptoms of great debility make their appearance; or until the morbid heat be carried off, and the skin opened. Several eminent modern physicians[1], however, recommend it to be given early in the disease, and persevered in; but from my own experience I am inclined to consider the former the safer practice, and believe that the best effects will be produced from the cinchona, when its use, in pure typhus, is not begun until the system has been fairly brought under the influence of mercurials, till the skin becomes moist, the tongue is in part cleaned, and the urine deposits a critical sediment. The best adjuncts in these cases are the diluted sulphuric, or the hydrochloric acids and aromatics, particularly the tincture of capsicum.

Cinchona was first conjectured to be useful in gout by Sydenham, and in some cases its efficacy is sufficiently evident. In rheumatism, also, Dr. Haygarth has lately strongly recommended it to be given, after the manner of Morton, Hulse, and Fothergill, from the commencement of the disease; the stomach and bowels being previously emptied by means of antimonial preparations. In my own practice, I have found it useful only after the liberal exhibition of calomel, tartarized antimony, colchicum, and opium, when the pain has partly abated, or assumed an intermittent character, and the pulse has become softer. Its efficacy in this disease is much increased by the addition of spirit of turpentine.

In phthisis, bark is found beneficial when the accompanying hectic puts on more of the intermittent form than usual; when the debility is considerable, and blood is mixed with the sputa; and in several cases of pneumonia, when, after repeated large bleedings and evacuations, the pulse continued hard and thrilling, and the blood buffy, although the expectoration was free and the skin open, I have seen bark produce the happiest effects.

In various cutaneous diseases, as lichen *agrius* and *lividus*; in purpura[2]; in impetigo *erysipelatodes* and *scabida*; in some varieties of erysipelas, and in extensive ulcerations both from common inflammation and venereal affections[3]; in the termination of all acute diseases after the urgent symptoms are

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[1] *Clarke* of Newcastle, *Heberden*, &c.
[2] *Willan.*
[3] *Pearson.*

subdued; and in dyspepsia, chronic debility, and nervous affections, cinchona is found to possess great efficacy.

As a local remedy, bark is sometimes used in the form of gargle in malignant sore throat and aphthous affections: and as a wash to fetid gangrenous sores: but in these cases the red bark is to be preferred. Powerful effects, also, are said to have been produced on the body by frictions with the extract, softened by saliva or oil, upon the thighs and other parts of the body. It may be efficaciously administered per anum, when it cannot be taken into the stomach; but Denman says he found no advantage from its use as a clyster in the low state of puerpural fever, in which it has been highly extolled.

Cinchona bark is administered in a variety of forms. (See *Preparations and Compositions.*) In substance it is reduced to the state of an impalpable powder; and although it loses some of its activity during the process of pulverization, yet, when it can be retained on the stomach, this is the best form of the remedy.[1] If it excite nausea or vomiting, or operate as a cathartic, or occasion costiveness, these inconveniences may in some degree be obviated by combining it with aromatics, opium, or a cathartic, as circumstances direct; or some of the lighter preparations, in which its active principles are supposed to be extracted, free from the grosser parts, may be employed. The powder is given mixed in wine[2] or in water; or, when the taste is an objection, in milk or syrup, or a solution of extract of liquorice, all of which effectually

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[1] Fabroni says, "Cinchona loses its solubility, and consequently its activity, by long exposure to the air, and by pulverization long protracted with the view of rendering it as fine as possible. From $\frac{6}{100}$ to $\frac{12}{100}$ parts of soluble matter are obtained from bruised cinchona, which in fine powder yields only $\frac{6}{100}$ or $\frac{7}{100}$ to water." Practitioners ought never to purchase bark in the state of powder, for in this state it is always found more or less adulterated. Dr. Paris (*Pharmacologia*) mentions that, in the official inspection of the shops of apothecaries and druggists, "the censors have repeatedly met with powdered cinchona, having *a harsh metallic taste.*" This may arise from the admixture of a species of bark, lately introduced into Europe from Martinique, resembling the Cinchona *floribunda;* and which, by an analysis of M. Cadet (*Journ. de Pharm.* vol. ii. p. 54.) was found to contain iron. The Cinchona *floribunda* is both emetic and purgative; and if this new bark possess the same properties, it is unnecessary to add, that it must prove injurious when combined with good cinchona. A less injurious but equally fraudulent admixture is the powder of bark which has been employed in making the extract; and of very inferior bark, much of which, we have been informed, is imported for no other purpose.

[2] In the *Schedion*, an Italian handbill of directions for using the bark, published in 1649, "two drachms of the bark, finely powdered and infused in good white wine, three hours before the expected paroxysm," are ordered to be taken as soon as the slightest symptom of the attack appears.

cover the taste, provided the dose be taken directly after it is mixed.[1]

The dose of the powder is from grs. v. to ʒ ij. or more. In intermittents the full dose is sometimes given at first[2]; but in other diseases, grs. v. x. or xv. are sufficient to commence with, the dose being repeated every two, three, or four hours, and gradually increased, until one or two ounces, in some cases, be taken in twenty-four hours.

Officinal preparations.—*Infusum Cinchonæ,* L. E. D. *Decoctum Cinchonæ,* L. E. D. *Extractum Cinchonæ,* L. E. D. *Tinctura Cinchonæ,* L. E. D. *Tinctura Cinchonæ composita,* L. E. D. *Quinæ Disulphas,* L. D.

CINNAMOMI CORTEX. Vide *Laurus Cinnamomum.*

CINNAMOMI OLEUM. *Ibid.*

CISSAMPELOS. *De Candolle Syst. Nat.* i. p. 530.

Cl. 22. *Ord.* 10. Linn. Diœcia Dodecandria. *Nat. ord.* Menispermiæ.

G. 1826. *Male. Calyx* four-leaved. *Corolla* none. *Nect.* rotate. *Stamens* five. *Filaments* connate.

Female. Calyx one-leafed, ligulate, subrotund. *Corolla* none. *Styles* five. *Berries* one-seeded.

Sp. 15. C. *Pareira. Willd. tome* 9. *p.* 861. *Woodville's Med. Bot.* 227. *t.* 82.

Officinal. PAREIRA, *Lond.* PAREIRA (*Brava*).

This plant is a native of South America, Jamaica, Saint Domingo, and several other of the West India islands. It is a climbing plant, with smooth or closely pressed pubescent stems. The leaves are semi-orbiculate, mucrenate at the apex, smooth on the upper but pubescent on the under disk, with the petioles of various length, often longer than the limb, and peltate in both sexes. The flowers are in racemose corymbs with divaricate pubescent branches, and furnished with sessile bractes, roundish, scarcely mucrenulate at the apex. The fruit is a roundish, compressed, red berry, with a rugose, attenuated margin, and covered with long hairs.

Qualities.—The root, which is the officinal part, is imported in pieces of various thickness, from that of the finger

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[1] Mutis, conceiving that fermentation is the best method for extracting the active part of cinchona, has proposed to make a beer of it, by fermenting one part of the bark in powder with eight parts of honey or sugar, and 80 or 100 of water. And Alibert, having persuaded a brewer to make some beer with cinchona, administered it to convalescents, weakened by protracted intermittents, with the best effects.

[2] This was always the case, on the first introduction of the remedy into European practice. In the *Schedion,* two drachms in fine powder are ordered to be macerated for three hours in a glass of white wine, and given at the commencement of the paroxysm. The patient was also ordered to abstain from all other medicine.

to the arm, and two feet or more in length, often twisted, and covered with a thin, firmly-adhering, smooth, brown cuticle. The interior is ligneous, of a yellow colour, and porous. It is inodorous, and has a sweetish, nauseous, bitter taste; yielding its properties both to water and alcohol. According to the analysis of M. Fenuelle, it contains a soft resin, a yellow colouring matter, a brown principle, fecula, malate of lime, nitrate of potassa, and a peculiar azotised matter.

Medical properties and uses.—According to Piso, the juice of this species of Pareira was formerly employed in Brazil against the bites of serpents. It was also known to the Brazilians as a remedy in obstructions of the urinary organs. Pareira Brava is moderately tonic, aperient, and diuretic. Helvetius first investigated its influence in nephritic and calculous cases; and he ascribed to it lithontriptic powers. Geoffrey, who also examined it as a medicine, says that it operates by dissolving the mucous, by which the sabulous matter adheres in calculous diseases; but it is probable that its influence is purely tonic and diuretic. Sir Benjamin Brodie extols its powers in chronic inflammation of the bladder: it allays, he thinks, the irritability of the organ, and lessens the formation of the ropy, alkaline mucous. It has also been administered in ulcerations of the kidneys, leucorrhœa, dropsy, rheumatism, and jaundice. Sir B. Brodie adds to it the tincture of henbane; and where there is a deposit of the triple phosphates, indicated by milky urine, and an iridescent pellicle on its surface, he conjoins with it nitric acid.

The dose of the powdered root is from ʒ ss. to ʒj.

Officinal preparation.—*Infusum Pareiræ*, L.

CITRUS. *Spec. Plant. Willd.* iii. 1426.

Cl. 18. *Ord.* 3. Polyadelphia Icosandria. *Nat. Ord.* Aurantiacæ.

G. 1391. *Calyx* five-cleft. *Petals* five, oblong. *Anthers* twenty, the filaments united into different parcels. *Berry* nine-celled.

Species 1. C. *medica.* The Lemon-tree. *Med. Bot. 3d edit.* 528. *t.* 189.

Species 4. C. *Aurantium.* The Orange-tree. *Med. Bot.* 3*d edit.* 523. *t.* 188.

1. CITRUS MEDICA.[1] Var. β. C. *Limon.*

Officinal. LIMONES. LIMONUM CORTEX. LIMONUM OLEUM. LIMONUM SUCCUS. *Lond.* CITRI MEDICÆ CORTEX: OLEUM VOLATILE: SUCCUS, *Edin.* CITRI FRUCTUS SUCCUS, TUNICA EXTERIOR, ET EJUS OLEUM VOLATILE, *Dub.* Lemons: their rind, and its essential oil.

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[1] Μηλεα μηδικη Theophrasti et Dioscoridis.

Syn. Citronier (*F.*), Zitronebaum (*G.*). Limon (*I.*), Citri (*S.*), Lémōn (*Arab.*), Lému (*H.*), Jambéra (*Sans.*), Elimitchum pullum (*Tam.*), Jerook (*Malay*), Usi (*Celebes*).

The lemon-tree is a native of Assyria and Persia, whence it was brought into Europe; first to Greece, and afterwards to Italy.[1] It is now cultivated in Spain, Portugal, and France, and is not uncommon in our green-houses.[2] It is a beautiful ever-green, of small growth, sending off numerous branches covered with a greyish bark. The leaves are alternate, of a shining pale-green colour, ovate, acuminate, about four inches long, and two inches broad, slightly indented at the edges, and supported on naked linear footstalks. The flowers, which appear the greater part of the summer, are odoriferous, large, and placed on simple and branched peduncles, arising from the smaller branches. The calyx is saucer-shaped, with the teeth pointed; the petals are oblong, concave, white, with a purplish tinge on the outside; the filaments, united at their base into four parcels, support yellow vertically-placed anthers; and the germen is superior, roundish, and having a simple style with a globular stigma. The fruit is ovate, pointed at each end, rough, punctured, externally of a pale-yellow colour, and internally divided into seven, nine, or eleven cells, containing four seeds in each, and filled with vesicles distended with a sharp acid juice. The rind is double: the exterior part thin, yellow, and chiefly made up of a great number of vesicles filled with a very fragrant oil; the interior thicker and whiter than the exterior, and coriaceous.[3]

Lemons are brought to England from Spain and Portugal, and some from the West Indies, but the latter chiefly supplies the Lime, the C. *aeris.* It is smaller than the lemon, of an oval shape, thinner in the rind, and although as acid, yet milder than the lemon. Lemons are imported, packed in chests, and each lemon separately rolled in paper. The Spanish lemons are most esteemed.

Qualities. — Lemon-*juice* is sharp, but very gratefully acid. It consists principally of the citric acid, mucilage, extractive matter, a small portion of saccharine matter, and water. Before Scheele's process was known, many different unsuccessful plans were adopted for separating the citric acid;

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[1] Venit in Italiam post Virgilii et Plinii tempora, ante Palladii. *Willd. S. P.* iii. 1426. The fertility of the lemon-tree is proverbial in Italy. A wager was laid in 1812, by Signor Antonio Georgeri of Massa, with Marchese Calani of Spezia, that at Cresullo, half a mile from Massa, there was a lemon-tree which would mature, that year, fourteen thousand lemons. It exceeded the quantity. *Lander's Conversations*, vol. i. p. 122.

[2] It was first cultivated in Britain in the Oxford garden about the year 1643.

[3] *Gærtner de Fructibus*, vol. ii. p. 189.

which is now obtained in a crystallized form, and admitted into the London and Dublin pharmacopœias.[1] The simple juice, although well depurated of its extractive matter, yet soon spoils; and therefore the crystallized acid dissolved in water is generally used in its stead.

The *rind* is warm, aromatic, and slightly bitter, qualities depending on the volatile oil it contains, which is given out to water, wine, and alcohol.

The *oil*, which is obtained by distillation, is extremely light, nearly colourless, and fragrant; and has the same taste as the rind, only in a greater degree. It is very volatile, yet does not readily rise with alcohol or with proof spirit.

Medical properties and uses.—Lemon-*juice* is refrigerant and antiseptic. It is given diluted with water and sweetened, forming the beverage called lemonade, to quench thirst, and abate heat, in febrile and inflammatory diseases. Given alone to the extent of a table-spoonful for a dose, it allays hysterical palpitations of the heart; and in combination with carbonate of potassa (f ℥ ss. of the juice to ℈ j. of the salt), taken in a state of effervescence, it is used with great success to allay vomiting, and determine to the surface. A still more useful and pleasant effervescing draught is made by putting a table-spoonful of lemon-juice, mixed with a small quantity of sugar, into a tumbler, and pouring over it half a pint of soda-water. On account of its antiseptic powers, lemon juice is successfully used in sea scurvy; and for this purpose large quantities of it, in a concentrated state, are distributed in the navy; but the continued use of it is said to be hurtful to the general health of the men, and to hasten the progress of phthisis where it makes its appearance. Dr. Wright observes, that its powers are increased by saturating it with chloride of sodium, and recommends such a mixture in remittent fever, dysentery, colic, putrid sore-throat, and as being almost specific in diabetes and lientery: but it must be recollected that chloride of sodium is itself a remedy for scurvy. Lemon-juice is given also united with camphor, infusion of cinchona bark and wine, in the above diseases: and, mixed with ardent spirits and water with sugar, it forms *punch*, which is a useful cordial in low fevers.

Lemon-*peel* or rind is added to stomachic tinctures and infusions, and is particularly applicable in dyspepsia, arising from irregularities in diet, and the inordinate use of ardent spirits.

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[1] For an account of this acid, vide *Acidum Citricum* among the Preparations.

The *essential oil* is chiefly used as a perfume, to cover the smell of sulphur in ointments compounded with it.

Officinal preparations.—Of the juice, *Syrupus Limonum,* L. E. D. *Acidum Citricum,* L. D. *Infusum Aurantii comp.* L. D. *Infusum Gentianæ comp.* L. D. Of the rind, *Aqua Citri medicæ,* E.

2. CITRUS AURANTIUM.[1] C. VULGARIS OLEUM.

Officinal. AURANTIUM, FLORES, AURANTII OLEUM, *Lond.* AURANTII CORTEX, *Lond.* CORTEX, SUCCUS, *Edin.* FRUCTUS, SUCCUS, TUNICA EXTERIOR, FLORES, FOLIA, *Dub.* The flowers, fruit, and outer rind of the Seville orange.

Syn. (*Immature fruit,*) Fruit verts d'orange (*F.*), Unreife Pomeranzen (*G.*), Pomeransknopp (*Swed.*), Collungie pullum (*Tam.*), Jeroc manis (*Malay*), Jeruklegi (*Jav.*), Panneh dodang (*Cyng.*) Usi (*Celebes*).—(*Ripe fruit and its rind,*) Orange, Ecorce d'orange (*F.*), Pomeranzen baum, Pomeranzenschuske (*G.*), Arancio (*I.*), Naranja (*S.*), Narenj (*H.*), Nágaranga (*San.*).

The orange-tree is a native of India and Persia; but it is now abundantly propagated in the south of Europe and the West India islands, and is also found in our green-houses. There are two varieties; one is the sweet orange, the other is the Seville or bitter orange, Citrus *vulgaris.* In its general appearance the orange resembles the lemon tree, but the leaves, which are not so large as those of the lemon, and more pointed, are entire, smooth, and furnished with wings or appendages on the footstalks, by which it is particularly distinguished. The flowers, like those of the lemon, appear all the summer, are large, white, odorous, and arise from the smaller branches upon simple and branched pedicles. The parts of the flower resemble closely those of the lemon. The fruit is globular, rough, and of a deep reddish-yellow or orange colour; internally divided into nine cells, filled with a vesicular pulp, and each containing from two to four seeds. The rind, like that of the lemon, is double: the exterior thin and glandular; the interior thick, whitish, and fungous. Both sweet and Seville oranges are imported chiefly from Spain, in chests, and packed in the same manner as lemons.

Qualities.—The fresh *flowers* of the orange impart to water distilled with them their peculiar fragrance. It is now officinal in the London Pharmacopœia as well as the Dublin. (See *Preparations,* Part iii.) The *juice* of the Seville orange, Citrus *vulgaris,* is a grateful acid liquor, with a slight degree of bitterness. It consists of nearly the same principles as the juice of the lemon; with a smaller portion, however, of citric

[1] Aurantia forte à corticis colore, qui colore auri relucet, ut aurea mala vere nominari possunt: sive ab Arantia oppido dicta, veteribus ignota, insitione ad nos devenerunt. *Bauhin. Pin.* p. 436.

acid. The juice of the sweet orange is less acid and free from bitter. The *exterior rind* has a very grateful aromatic odour, and a warm bitter taste, depending on the essential oil contained in its vesicles. Both the bitter and aromatic parts are extracted by water and alcohol, and the essential oil can be obtained by distillation. The *unripe fruit* of Citrus *vulgaris*, named in common Curaçoa orange, has the aromatic flavour of the rind with a greater degree of bitterness, both of which it retains when dried. The Curaçoa oranges vary in size from that of a pea to that of an acorn. The *distilled water* has the grateful perfume of the flowers.

Medical properties and uses.—The *juice* of the Seville orange is employed in the same diseases, and with the same intentions, as lemon-juice, but it is not so generally used. The sweet orange is used in the same cases. The *rind* is a useful stomachic, carminative, and tonic, and is a common addition to bitter infusions in dyspepsia. In gout it is joined with magnesia and alkalies; and when the cinchona does not sit easily upon the stomach, it is a most useful adjunct to that remedy in whatever form administered. It has also been given alone in intermittents with seeming advantage.[1] The *oil* is only used as a perfume: but it may be added to bitter infusions as an oleo-saccharum.

The dried *unripe fruit* (*Aurantium curassaventium*) is employed as an internal remedy in the same cases as the rind of the ripe orange. It is, however, more commonly used as a mechanical irritant in issues; for which purpose the smaller fruit is selected, and generally made round and smooth in the turning lathe. It is preferred for this purpose on account of its odour only, for the heat and moisture of the part in which the orange is lodged swells it as much as the common pea; and, therefore, it requires to be renewed once in twenty-four hours.

The usual dose of the dried rind, and of the Curaçoa orange, is from grains x. to ʒj., which are given three or four times a day.

Officinal preparations.—Of the juice, *Succus Cochleariæ comp.* E. Of the rind, *Infusum Aurantii compositum*, L. *Infusum Gentianæ comp.* L. E. D. *Tinctura Aurantii*, L.D. *Tinctura Cinchonæ comp.* L. E. D. *Tinctura Gentianæ comp.* L. D. *Spiritus Armoraciæ comp.* L. D. *Syrupus Aurantii*, L. D. *Confectio Aurantii*, L. E. D. *Aqua Citri Aurantii*, E. *Aqua florum Aurantii*, L.

3. CITRUS LIMETTA BERGAMIUM.

Officinal. BERGAMII OLEUM, *Lond.* Oil of bergamotte.

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[1] *Murray's App. Med.* vol. iii. p. 289.

This species of Citrus has pyriform fruit of a pale yellow colour, with concave vesicles, and a slightly acid aromatic, agreeable pulp. The bark of the fruit when distilled yields the volatile oil known by the name of bergamotte.

Qualities.—This oil is limpid, of a very pale straw colour; has a very agreeable odour, and a bitter pungent taste.

Medicinal properties and uses.—The oil of bergamotte possesses the same excitant properties as the other volatile oils, for which it may be substituted. It is chiefly employed as a perfume. The reason for introducing it into the pharmacopæia is not very obvious.

COCCULUS. *De Candolle, Syst. Nat.* i. 515.

Cl. 22. *Ord.* 10. Diœcia Dodecandria. *Nat. ord.* Menispermeæ.
G. 1826. *Male.* *Calyx* two-leaved. *Petals* four or six exterior, eight interior. *Stamens* sixteen.
Female. *Corolla* similar to that of the male. *Stamens* eight, sterile. *Germens* two or three. *Berries* one-seeded.
Sp. 4. C. *palmatum.* Palmated Menispermum. Cocculus *palmatus.* De Cand. *tom.* 1. *p.* 522. Berry, *Asiatic Res.* 10. *p.* 385. *t.* 5. *Woodville's Med. Bot.* vol. v. p. 22. *Willd.* iv. p. 825.
Officinal. CALUMBA, *Lond.* COLOMBÆ RADIX, *Edin.* COLOMBA RADIX, *Dub.* Calumba root.

Syn. Colombe (*F.*), Kolumbowurzel (*G.*), Colomba (*I.*), Kalumb (*Mozambique*), Columboo vayr (*Tam.*).

The London College has now properly referred this root to the Cocculus *palmatus* of De Candolle, the Menispermum *palmatum* of Willdenow.

This species of Cocculus is a native of the eastern part of Southern Africa, growing in great abundance in the forests of Mozambique, between Oibo and Mozambo. The roots are dug up by the natives in the month of March, and transported to Tranquebar, where it is a staple article of export with the Portuguese.[1] An entire root was taken to Madras by Mons. Fortin, in 1805, and a plant raised from it there by Dr. Anderson, from a drawing of which it was ascertained to belong to the natural order Menispermeæ; but as it was a male plant only, the genus and species were undetermined until they were fixed by De Candolle. In 1825, both male and female plants were obtained by Captain Fitzwilliam Owen, from Oibo, and carried to the Mauritius, Bombay, and the Seychilles Archipelago. Dr. Berry drew up the following character of the male plant, which has been adopted by De Candolle; but the female plant is yet undescribed. The root is perennial, ramose, and bears fusiform tubers.

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[1] The root was formerly erroneously supposed to be named from the principal town in the island of Ceylon, which was regarded as its place of export.

The stems are annual, withering at the end of seven months; voluble, simple, round, hairy, about the thickness of a goose-quill, bearing distant, alternate, five-lobed, five-nerved leaves, with entire acuminate lobes; and supported on round hairy petioles, shorter than the leaves. The male flowers are in axillary, solitary, compound racemes, hairy, and shorter than the leaves: bearing partial, alternate peduncles, with sessile flowers; and lanceolate, ciliated, deciduous bractes. The calyx is hexaphyllous, with three exterior leaflets, and three interior, equal, oblong, obtuse, and glabrous. The corolla consists of six minute, oblong, wedge-shaped, concave, fleshy, obtuse petals. The stamens are six, a little longer than the corolla; the anthers four-lobed and four-celled: there is no pistillum. The roots are dug up in March; but the offsets only are taken; each offset being a sessile tuber. In the female plant, the racemes are solitary, axillary, patent, and shorter than those of the male. The calyx and petals resemble those of the male. The pistils are three, free, of which two are abortive: they are ovate, acuminate, glanduloso-pilose, and contain one ovule. The style is short; the stigmas patent; the fruit drupaceous; the seed subreniform, black, striated.

The dried root is brought to this country packed in bags, and sometimes in cases. It is in transverse sections, generally about one third of an inch in thickness, and one or two inches in diameter. The bark is thick, and easily detached, internally bright yellow, and covered with a wrinkled olive-brown cuticle. The interior part of the root is of a pale brownish colour, and has a spongy texture, with darker converging rays, which are the remains of sap-vessels. The pieces are frequently much perforated, evidently by worms, and not, as has been supposed, by stringing to facilitate its drying. Those pieces which have the fewest worm-holes, the brightest colour, and are solid and heavy, are the best. It is said that the root of white bryony, tinged yellow with the tincture of calumba, has been fraudulently substituted for this root.

Qualities.—Calumba root has a very slight aromatic odour, and a bitter taste. It breaks with a starchy fracture, and is easily pulverized. Water at 212° takes up one third of its weight; and the infusion has all the sensible qualities of the root. These are also extracted by alcohol, but proof spirit is its best menstruum. The infusion is not altered by solutions of sulphate of iron, nitrate of silver, muriate of mercury, and tartarized antimony; but a copious precipitate is produced by the infusion of galls and yellow cinchona bark, by acetate and superacetate of lead, oxymuriate of mercury, and lime-water. Hence calumba root was erroneously supposed to contain cinchonia. M. Planche found it to contain a large proportion of a peculiar animal substance; a yellow, bitter, resinous matter; and one third of its weight of starch.[1] By repeated distillation, he also obtained a volatile oil; and, from the residue malate of lime and sulphate of lime. By treating calumba root with alcohol of 0·835, then reducing the tincture by distillation to one third, allowing the residue to stand until crystals form in it, and afterwards purifying these, Mr. Wittstock of Berlin procured a new salt, to which he gave the name of *colombin*, and which he supposes to be the active principle of calumba root. It is inodorous, extremely bitter, neither acid nor alkaline, forms in quadrilateral, transparent acicular crystals, scarcely soluble in water or in cold alcohol. The acetic acid is its proper menstruum[2]: but it is also taken up by alkaline solutions.

Medical properties and uses.—Calumba root is a useful antiseptic and tonic.[3] It was first brought into notice by Fr. Rede, in 1685. It is frequently employed with much advantage in diarrhœas arising from a redundant secretion of bile, and in bilious remittent fever, and cholera, in which it generally checks the vomiting. It also allays the nausea and vomiting which accompany pregnancy; and, according to Percival, it is equally serviceable in stopping the severe diarrhœa and vomiting which sometimes attend dentition.[4] Denman found it more useful than the cinchona in the low stage of puerperal fever.[5] As a tonic, unaccompanied with astringency, and possessing little stimulus, it has been recommended in phthisis and hectic fever, to allay irritability, and strengthen the digestive organs; and in dyspepsia. It may be given combined with aromatics, orange-peel, opiates, and alkaline, or neutral salts, as circumstances require. We have found the powder, in combination with rhubarb and sulphate of potassa, exceedingly serviceable in mesenteric fever.

The dose of the powdered root is from grs. xv. to ʒss., repeated three or four times a day.

Officinal preparations.—*Infusum Calumbæ*, L. E. *Infusum Columbæ*, D. *Tinctura Calumbæ*, L. E. D.

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[1] Iodine produces a blue in the infusion of calumba, which distinguishes the true from a false calumba, sometimes found in the market.

[2] *Journ. de Pharmacie*, Fevrier, 1831, p. 77.

[3] The Africans of Mozambique esteem it as a remedy for venereal affections, and the Chinese employ it as an aphrodisiac.

[4] *Medical and Experimental Essays*, vol. ii.

[5] *Introd. to Midwifery*, ii. 524.

COCCUS.[1] *Syst. Nat. Gmelin*, 2220.

Cl. 5. *Ord.* 2. Insecta Hemiptera.[2]

G. 229. *Rostrum* or *Snout* seated on the breast. *Antennæ* filiform. *Abdomen* bristled behind. *Wings* two, erect in the males; females apterous.

Species 22. *C. Cacti.* Cochineal Insect. *Reaum. Ins.* iv. *t.* 7. *fig.* 11, 12. *Phil. Trans.* lii. 661. *pl.* 21. *Brandt & Ratziburg Medizinische Zoologie*, ii. 217.

Officinal. COCCI, *Lond.* COCCUS CACTI, *Edin. Dub.* Cochineal.

Syn. Cochenille (*F.*), Cochenille, Koschenille, Scharlachwurm (*G.*), Cochenilje (*Dutch*), Koskenillen (*Swed.*), Cuzzinel (*Dan.*), Cocciniglia (*I.*), Cochinilla (*S.*), Cochineel poochie (*Tam.*).

This coccus is found in its wild state in Mexico, Georgia, South Carolina, and some of the West India islands, feeding on several species of cactus, particularly the common Indian fig, or prickly-pear plant (*Cactus Opuntia*)[3]: but in Mexico, particularly in the provinces Oaxaca and Guaxaca, and some of the adjoining Spanish settlements[4], where the insect is, as it were, domesticated and reared with great care, it feeds only on a species of cactus which was supposed to be the Cochineal Indian fig (*Cactus coccinilifer*); but which, Humboldt says, is a distinct species, the fruit being internally white. It is cultivated for this purpose; and on it the insect attains to a greater size than in the wild state. It is a small insect, very seldom exceeding a barley-grain in magnitude; with the head, except in the males, scarcely distinct from the body, which is depressed, downy, and transversely rugose. The abdomen is of a purplish-red colour, flat below and convex above; and the legs are six in number, short and black. The males, which are few in proportion to the females, there being one only to 100 or 200 females, are winged, slender, and active, with the body of a red colour: the head is small, but very distinct from the neck, furnished with jointed feelers, and two long diverging white hairs, about five times the length of the body, which proceed from the tail: the body is elliptical, and furnished with white wings, which lie flat when the insect rests or walks, but are erected when it flies. The females have no wings and are sluggish, and after impregnation

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[1] Κοκκος βαφικη Dioscoridis is the Kermes or Coccus *Ilicis*, Linn. which was known, as a dye, by the Phœnicians before the time of Moses; and was the *tola* of the Jews. *Beckman's Hist. of Inventions*, translation, vol. ii. p. 185.

[2] Cl. vii. *Rhyngota*, Spec. 21. *Fabricii.*

[3] These plants have neither stem nor leaves, in the common acceptation of these words, but consist of roundish or oval compressed joints, that grow out of each other.

[4] "Kascala, Chulula, Nueva Gallicia, Chiapa, in New Spain; and Hambatio, Loja, and Tucuman, produce the greatest quantity," *Ulloa*, quoted by *Bancroft*.

scarcely ever move from the part of the plant where they fix themselves. The back is hemispherical and crossed by numerous wrinkles; the body is of a much deeper red than that of the males; on the breast is an awl-shaped papilla, through which a fine thread is spun to form a web, with which the insect envelopes itself as soon as it is fully impregnated; when it becomes torpid, and immediately after laying its eggs dies, and is a mere useless husk.

The wild cochineal is collected six times in the year, just before the females begin to lay their eggs; a few being left on the plants to furnish a future supply. But the domesticated insect is collected thrice only in the same space of time, the domestication diminishing the number of broods to three in the year, owing to their propagation being suspended during the rainy seasons, whilst the downy covering of the wild species allows them to withstand the inclemency of these seasons. At the third gathering, branches of the plant, to which a certain number of females is left adhering, are broken off, and preserved with great care under cover during the rainy season; and after this is over they are distributed over the out-door plantations of the cactus, where they soon multiply, and in the space of two months the first crop is fit to be gathered. The insects are detached from the plant by means of a blunt knife, then put into bags and dipped into boiling water to kill them; after which they are dried in the sun: and although they lose two thirds of their weight in this process, yet about 600,000 lbs.[1] are brought annually to Europe.

Cochineal was used by the natives of Mexico, when the Spaniards arrived there in 1518; and was introduced into Europe about the year 1523. The domesticated kind, which is not only much larger, but yields a richer colour, and is consequently most esteemed, is known in the language of the Spanish merchants by the name *grana fina:* the wild is one half the size only of the other, covered with white down or powder, and is denominated *grana silvestra;* but as we receive them, both the kinds are often mixed together. They are imported in bags, each containing about two hundred weight, and have the appearance of small, dry, shrivelled, rugose berries or seeds, of a deep brown purple or mulberry

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1 Each pound is said to contain 70,000 insects. The monopoly of cochineal is still in the hands of the Spaniards; but attempts are making to propagate it in the East Indies, if the death of Dr. Anderson has not terminated them. Of the whole quantity brought to Europe, about 150,000 lbs. may be considered as the present annual consumption of Great Britain (1812), which at 30*s.* per lb. cost 225,000*l.* sterling.

colour, with a white matter between the wrinkles. In this state they suffer no change from length of keeping. Dr. Bancroft directs that cochineal to be chosen as the best, which "is large, plump, dry, and of a silver-white colour on the surface."[1]

Qualities.—Cochineal has a faint, heavy odour, and a bitter, austere taste. It is easily pulverized, affording a powder of a purplish red hue, which has been found to be composed chiefly of carmine, (a peculiaranimal matter,) a fatty matter, phosphate and carbonate of lime, and muriate and phosphate of potassa[2]: the colouring matter is taken up by water, alcohol, and solutions of the pure alkalies. The watery infusion is of a violet crimson, the alcoholic of a deep crimson, and the alkaline of a deep purple, or rather violet hue. The colour of the watery infusion is brightened by all the acids; it is destroyed by chlorine. It is brightened also by bitartrate of potassa and alum; and, at the same time, is partly precipitated. It is also precipitated by sulphate of iron of a brownish violet colour, the liquid remaining a pale yellowish brown; and by sulphate of zinc and acetate of lead of a purple violet, the liquid being perfectly colourless: cochineal, therefore, is incompatible as a colouring matter with these metallic salts. According to the analysis of Pelletier and Caventou, it contains carmine (*cochinaline*), a fatty matter, phosphate and carbonate of lime, hydrochlorate and phosphate of potassa, and potassa united to an animal acid.[2]

Medical properties and uses.—Cochineal has lately been recommended as an antispasmodic and anodyne in hooping-cough. I have had no experience of its effects as an antispasmodic, and still less so as an anodyne in neuralgia, for which it has been extolled by M. Sauter, who gave one hundred and twenty drops of a saturated tincture, morning and evening. It is well fitted for giving a fine colour to tinctures and similar preparations.

COCHLEARIA.[3] *Spec. Plant. Willd.* iii. 448.

Cl. 15. *Ord.* 1. Tetradynamia Siliculosa. *Nat. ord.* Cruciferæ.

G. 1228. *Silicle* emarginate, turgid, rugged; with gibbous obtuse valves.

Species 1. C. *officinalis.* Common Scurvy Grass. *Woodville, Med. Bot. t.* 29. *Eng. Bot. t.* 557.

Species 8. C. *Armoracia.*[4] Broad Horse-radish. *Med. Bot. 3d edit.* 400. *Smith's Flora Brit.* ii. 690.

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1 *Philosophy of Permanent Colours,* 2d edit. i. p. 434.
2 *Journ. de Pharm.* 1818, p. 526.
3 Named from a fancied resemblance of the leaf to an old-fashioned spoon.
4 Ῥαφανὶς ἀγρία Dioscoridis.

1. COCHLEARIA OFFICINALIS.

Officinal. COCHLEARIA OFFICINALIS; HERBA, *Dub.* Herbaceous part of Common Scurvy Grass.

Syn. Cransin officinal (*F.*), Loffelkraut (*G.*), Cochlearia (*I.*).

This is an indigenous annual, which grows on the sea-shore, and sometimes on mountainous places, in the north-west of England, and throughout the north of Europe, flowering in May. It is a smooth, fleshy plant, varying much in height, with an angled, branching, foliaceous stem. The radical leaves are reniform, spreading, and subdentate, on long petioles: the caulinar leaves are sessile, embracing, alternate, oblong, and angularly sinuated. The flowers are terminal, corymbose, and without bractea. The calyx is obtuse, spreading, concave; the petals white, entire, obovate; the fruit a globose silicle, crowned with a very short style, a little rough, and obscurely veined.

Qualities.—The fresh plant has a pungent odour when bruised, and a bitter, acrid taste, which are lost by drying. When distilled, it affords a volatile oil and sulphuretted hydrogen gas.

Medical properties and uses.—The fresh plant is stimulant and diuretic; and may prove useful when eaten freely as a salad: but its infusion in the dried state is perfectly inert.

2. COCHLEARIA ARMORACIA.

Officinal. ARMORACIA, *Lond.* COCHLEARIÆ ARMORACIÆ RADIX, *Edin. Dub.* Horse-radish root.

Syn. Cran, Raifort sauvage (*F.*), Murretig (*G.*), Meerradys (*Belg.*), Peperrod (*Dan.*), Pepperrot (*Swed.*), Chrzan (*Polish*), Chren (*Russian*), Rafano rusticano (*I.*), Marvisco (*S.*), Rubao Rusticano (*Portug.*), Morungy vayr (*Tam.*).

This plant is a perennial, growing wild in many parts of England in moist situations, and in waste grounds, flowering in June; but it is generally cultivated for culinary and medicinal purposes. The root is long, tapering, and white, sending up many leaves, and a round, erect, branched stem, which rises about two feet in height. The radical leaves are petiolate, very large, lance-shaped, and waved, crenate, and sometimes pinnatifid. Those of the stem are sessile, much smaller, lanceolate, sometimes divided at the edges, at other times entire. The flowers are in terminal clusters, numerous, and of a white colour. The leaves of the calyx are ovate, concave, spreading, and deciduous; the petals white, obovate, twice the length of the calyx, and inserted by narrow claws. The germen is heart-shaped, bearing a simple permanent style, crowned with an obtuse stigma, and changing into an elliptical bilocular pod, containing four seeds in each cell, which frequently prove abortive.

As the acrimony, on which its virtues depend, is lost in some degree by drying, it should be preserved in sand, in a cool place.

Qualities.—Horse-radish has a pungent odour, and a very hot, biting, acrid taste, with some degree of sweetness. When kept until it is quite dry, it loses more than two thirds of its weight, and in time the whole of its pungency is dissipated.

Both water and alcohol extract its active principles. The infusion reddens litmus paper, and precipitates solutions of acetate of lead and of nitrate of silver. Coction destroys its acrimony, which depends on a volatile oil, that can be obtained separate when the mashed root is distilled with water. The oil is of a pale yellow colour, heavy, volatile at 60°, with an extremely pungent odour, and a sweetish, strong, acrid taste, exciting inflammation in the tongue and lips, to which it is applied. Einhoff, who examined this root, says, the distilled watery liquid yields traces of sulphur.[1]

Medical properties and uses.—This root is stimulant, diaphoretic, and diuretic; and externally rubefacient. It is used, with advantage, in paralytic affections and chronic rheumatism, both internally and externally; and in dropsy, particularly when it follows intermittent fever, in which it was successfully employed by Sydenham. It has also been found efficacious in some cutaneous affections; and as a local remedy, a syrup made with a concentrated infusion of it, as recommended by Cullen[2], removes hoarseness arising from relaxation. Horse-radish may be given in substance, in doses of ʒ ss. or more, scraped, or in small pieces swallowed whole.

Officinal preparations. — *Infusum Armoraciæ compositum,* L. *Spiritus Armoraciæ compositus,* L. D. *Cataplasma Sinapis,* L. D.

COCOS. *Spec. Plant. Willd.* iv. 400.

Cl. 21. *Ord.* 6. Monœcia Hexandria. *Nat. ord.* Palmæ.

G. 1680. *Spathe* general, one-celled. *Spadix* branched.
Male flowers. *Calyx* three-leaved. *Corolla* tripetalous.
Female ——. *Calyx* two-leaved. *Corolla* six-petaled.
Style none. *Stigma* hollowed. *Drupe* fibrous.

Species 3. C. *butyracea.* The Mackaw Tree. *Piso, Hist. Nat. lib.* iv. *p.* 125. (Pindova.)

Officinal. COCI BUTYRACEÆ OLEUM FIXUM, *Edin.* Palm-oil.

Syn. Huile de Cocobier du Brésil (*F.*), Olio di Cocco del Bresale (*I.*).

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[1] *Annales de Chimie,* lxx. 185.

[2] The syrup is made by infusing one drachm of scraped horse-radish in one ounce of boiling water, in a covered vessel, and adding double its weight of sugar. Of this syrup a tea-spoonful is to be swallowed leisurely, and repeated at intervals.

This species of palm is a native of Brazil, and is found in abundance near the mines of Ybaquenses, and in other parts of South America. It is a lofty plant with a stem from three to five feet thick, clothed with a rough bark, and the foliage forming a very dense shade. The fruit, which is collected throughout the year, is an obovate, one-celled, succulent drupe, of a yellow colour, with a point at the upper end; and at the base, the hard persistent calyx. The fruit has a filamentous skin and a fleshy pulp, and contains a hard nut, having a cartilaginous kernel, with nearly the same taste as that of the common cocoa-nut.[1]

This kernel yields the oil. It is first coarsely pounded, or ground in a mill, then macerated in hot water, until it parts with its oil, which, collecting on the surface of the water, concretes as it cools. It is afterwards purified by washing in hot water. But the greater part of the Palm-oil brought to Europe is the product of the Elais *Guiniensis*, the drupe of which abounds with a fat oil.

Qualities.—Palm-oil has an agreeable odour, resembling that of violets, or of the Florentine Iris, and a slightly sweetish taste. It is of the consistence of butter, and has a light lemon-yellow colour; it becomes rancid by long keeping, loses its pleasant odour, and its yellow colour fades to a dirty white. It is said to be sometimes imitated with hog's lard coloured with turmeric, and scented with Florentine Iris root.

Medical properties and uses.—This vegetable butter is emollient; and as such is sometimes used externally in frictions.

COLCHICUM. *Spec. Plant. Willd.* ii. 272.

Cl. 6. *Ord.* 3. Hexandria Trigynia. *Nat. ord.* Colchicaceæ.

G. 707. *Spathe. Corolla* six-parted, with a rooted tube. *Capsules* three, connected, inflated.

Species 1. C. *autumnale.* Meadow-saffron. *Med. Bot. 3d edit.* 759. *t.* 259. *Smith., Flor. Brit.* 400. *English Botany,* 133.

Officinal. COLCHICI CORMUS, COLCHICI SEMINA [2], *Lond.* COLCHICI AUTUMNALIS RADIX, *Edin.* —BULBUS, SEMINA, *Dub.* The bulb and the seeds of Meadow-saffron.

Syn Colchique (*F.*), Zeitloze, Weissen saffron (*G.*), Tydeloosin (*Dutch*), Hundedëd (*Dan.*), Tidlösa (*Swed.*), Colchico Autumnale (*I. S.*), Rozsiad (*Pol.*), Colkikon (*Dioscor.*).

This is an indigenous perennial plant, generally found, in many parts of Europe, growing in moist rich meadow grounds[3],

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[1] The Brazilians call it Inaia-miri.

[2] The Edinburgh College has erred in using the word *radix* instead of *cormus.*

[3] It is very abundant in Essex and Suffolk.

and flowering in September. The bulb is solid, egg shaped, and covered with a brown, membranous coat. The leaves, which appear in spring, are radical and spear-shaped, about five inches long, and half an inch broad at the base. They wither away entirely before the end of summer, and are nevertheless preceded by the flower, which appears in autumn without any leaves.[1] It is, however, proper to state, that the bulb from whichthe flowers spring is the offset of that from which the leaves have decayed. There is no calyx. The corolla, which is of a pale pinkish lilac colour, springs directly from the bulb, and consists of a tube about five inches long, two thirds of which are sunk in the ground, and a limb divided into six lanceolate keeled segments. The filaments are half the length of the segments of the corolla, subulate, united to the upper part of the tube, and supporting yellow erect anthers. The stigmas are revolute. The fruit is a three-lobed, three-celled capsule, on a thick, short peduncle. The impregnated germen remains under ground, close to the bulb, till the following spring, when it rises in its capsular form above the surface, accompanied by the leaves. The seeds are ripe about the end of June.

The thick old bulb begins to decay after the flower is perfectly expanded; and the new bulbs, of which there are always two on each old bulb, are perfected in the following June, from which time until the middle of August they may be taken up for medicinal use. The bulbs, when mature, on being cut transversely, yield a milky-looking acrid juice, which produces a beautiful cerulean blue colour, if rubbed with the alcoholic solution of guaiacum. To preserve the virtues of the plant, the bulb, as soon as possible after it is dug up, should be cut into transverse slices, not thicker than one eighth of an inch, and dried by placing the slices on clean white bibulous paper, distinct from one another, without heat, or at a very low temperature. The test of the drug being good and properly dried, is the appearance of the blue colour, on rubbing it with a little distilled vinegar and the alcoholic solution of guaiacum. The slices also should not appear deeply notched or panduriform; as this is the mark of the bulb having begun to empty itself for the nourishment of the young bulbs; and, consequently, to suffer in its medicinal powers, from the chymical change which, at this period, its contents must necessarily undergo for the nourishment of

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[1] From this circumstance it is called "*naked lady,*" in some parts of the country.

the offsets. The slices should be preserved in well-stopped bottles.[1]

The *seeds* of colchicum should be collected in July and August. They are nearly round, in size about one-eighth of an inch, and of a reddish brown colour. Their active properties reside in the testa; they do not spoil by being kept.

Qualities.—The recent bulb of this plant has scarcely any odour, but the little it has is *hircine.* When it is dug up at a proper season of the year, the taste is bitter, hot, and acrid, occasioning a warm sensation in the stomach, even when taken in a small quantity. At other seasons, however, and in some soils and situations, it possesses very little acrimony, and thence the contradictory opinions which authors have given of it. Its acrimony is said to reside in veratria, which can be separated from the other principles; this is the opinion of MM. Pelletier and Caventou, who discovered it in 1819, but Hesse and Geiger assert that it is a different alkaloid, which they have named *colchicia.*[2] It is procured in slender acicular crystals, is inodorous, has a bitter biting taste, but is less acrid than veratria, from which it differs in being soluble in water, and forming crystallizable salts with acids. The other components of the bulb are the following: a fatty matter, malic acid, a yellow colouring matter, gum, starch, inulin in great abundance, and lignin. Vinegar and wine are the best menstrua for extracting the active qualities of the bulb. A deposit forms in the wine, which Sir E. Home says is extremely acrid, exciting nausea and griping, and ought to be removed, as its removal does not alter the virtues of the medicine.[3] The seeds contain *colchicia,* and yield it up to wine, vinegar, and alcohol.

Medical properties and uses.—Meadow-saffron possesses diuretic, purgative, and narcotic properties. It is the *hermo dactylon* of the ancients. On the Continent, where it was recommended to notice by Baron Stoerck, it is a favourite remedy in dropsy, particularly hydrothorax, and in humoral asthma. But as it does not differ in its mode of action from squill, and is more uncertain in its operation, it has not been much used in that complaint in this country. In gout, rheumatism,

1 Horses eat the flowers of colchicum with impunity; it acts as a poison to all other quadrupeds.

2 To obtain *colchicia,* digest seeds of colchicum in boiling alcohol, and precipitate with magnesia. Dry the precipitate, and boil it with fresh alcohol: the colchicia is obtained by evaporation. *Geiger.*

3 *Phil. Trans.* 1817, part ii.

and other diseases of excitement, however, its efficacy has been fully ascertained; and, in allaying the pain of gout, it may be almost said to possess a specific property. It operates on the bowels chiefly, stimulating the orifice of the common gall duct in the duodenum, so as to produce copious bilious evacuations; and acting on the nerves, it diminishes the action of the arterial system. The petals of the flower, and the seed, possess the same medicinal properties as the bulb. In the seed the veratria exists in the testa or husk, and consequently the seeds should not be bruised in preparing the wine or tincture with them. When Colchicum is overdosed it operates as a powerful poison; causing severe diarrhœa, and the most dangerous collapse.

The dose in substance is from grs. iij. to grs. ix. of the dried bulb: and of the saturated vinous infusions, made by macerating ℥ jss. of the dried bulb, or ℥j. of the dried petals, or of the seed, in f ℥xij. of white wine, from ♏ xx. to ♏ lx. may be taken whenever the patient is in pain.

Officinal preparations.—*Acetum Colchici*, L. *Oxymel Colchici*, D. *Syrupus Colchici autumnalis*, E. *Vinum Colchici*, L. *Tinctura Seminum Colchici*, D.

COLOCYNTHIDIS PULPA. Vide *Cucumis Colocynthidis.*

CONIUM.[1] *Spec. Plant. Willd.* i. 1395.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 533. *Partial involucre* halved, three-leaved. *Fruit* nearly globular, five-streaked, notched on each side.

Species 1. Conium *maculatum.* Common hemlock. *Med. Bot.* 3d *edit.* 104. *t.* 42. *Smith, Flora Britan.* i. 302.

Officinal. CONII FOLIA, FRUCTUS, *Lond.* CONII MACULATI FOLIA, *Edin. Dub.* The leaves and seed of Hemlock.

Syn. Cigue ordinaire (*F.*), Geflecter Schierling (*G.*), Gevlakte Scheerling (*Dutch*), Skarntyde (*Dan.*), Spräckligodört (*Swed.*), Swinia wesz (*Pol.*), Boligolou (*Russian*), Cicuta maggiore (*I.*), Conio manchado (*S.*).

Hemlock is a biennial, umbelliferous, indigenous plant, growing under hedges, by road-sides, and among rubbish, flowering in June and July. The root, which is fusiform, branching, whitish, and fleshy, exudes, when cut, a milky juice. The stem rises erect about four or five feet in height, is branching and leafy, round, hollow, striated, smooth, shining, and maculated with brownish purple. The lower leaves are very large, above a foot in length, on large sheathing petioles, supradecompound, and shining; the upper ones are bipinnate; the whole stand upon channelled footstalks, proceeding from the joints of the stem, are incised, smooth, of a deep green

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[1] Κώνειον Dioscoridis. Cicuta *vulgaris major, Park,* 932. Cicuta, *Dod.* 461.

colour on the upper surface, but paler underneath. The rays of the umbels are ten or twelve, those of the umbellules fifteen or sixteen. The involucre consists of from three to seven short, turned-down, lancet-shaped, leaflets, with white edges spread at the base; the involucel of three or four leaflets on one side only, and spreading. The flowers are very small; the petals white, the outer ones rather larger than the inner, cordate, inflected; the stamens the length of the petals, supporting white orbicular anthers; the styles two, filiform, diverging, and crowned with round stigmas. The fruit is ovate, striated, *smooth*, and brownish when ripe.

Hemlock is distinguished from other umbelliferous plants, with which it may be confounded by its *large* and *spotted* stem[1], the dark and *shining colour of its lower leaves*, and their *disagreeable smell*, when fresh and bruised, resembling in some degree the urine of a cat.[2]

For medical use, the leaves should be gathered about the end of June, when the plant is in flower; the small leaflets picked off, and the footstalks thrown away. The picked leaflets are then to be properly dried (vide *Powders*, Part III.); and as exposure to the air and light destroys the fine green colour of the plant, which is supposed to injure its active qualities, the dried leaflets must be preserved in boxes completely filled by gently pressing down the leaves, then covered with a closely-fitted lid, wrapped in paper, and sealed; or, if powdered, the powder may be preserved good in closely-stopped opaque phials, for many years.

Qualities.—The odour of properly dried *hemlock-leaves* is strong, heavy, and narcotic, but not so disagreeable as that of the fresh leaves: the taste is slightly bitter and nauseous. They are easily pulverized; and the powder should retain the beautiful green colour of the leaves. The acrimony only of the fresh leaves is lost in drying: but the narcotic principle remains uninjured if the operation be well performed. The *seeds* are small, ovate, striated with five ribs, and of a greyish-green colour. The virtues of conium are extracted by alcohol and sulphuric ether. To ether the leaves communicate a very deep green colour; and when the etherial tincture is evaporated on the surface of water, a rich dark-green resin remains, in which the narcotic principle of the plant appears to reside: it contains the odour and taste in perfection; and

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1 The Chærophyllum *bulbosum*, bulbous-rooted cow parsley, has a spotted stem, but the joints are swelled, and the seeds *rough*.

2 In Ray's Synopsis, *Conium maculatum* is named *Cicuta*,—a name still retained by the Dublin College; and owing to which the water hemlock, *Cicuta virosa*, has sometime been confounded with it, and improperly used.

half a grain produces headach and slight vertigo. To this principle, which I discovered, Dr. Paris proposes to give the name of *Conein*[1]; but it merely contains *Conein* or Conia as one of its components. Brandes has discovered a particular principle of an alkaline nature, which he terms *Cicutine*, of a green colour, insoluble in water, and in doses of half a grain causing vertigo and headach. But it is to *Professor Geiger* of Heidelberg that the profession is indebted for the knowledge of the active principle of Conium. In 1827 Giseske had observed that in distilling hemlock and water with caustic lime, a strong odorous alkaline fluid was procured, which, when neutralized by sulphuric acid, formed a substance which was readily separated by alcohol, and was highly poisonous, its properties being the same as those of hemlock in a concentrated degree. Geiger in 1831, taking a hint from this result of Giseske's experiment, distilled the seeds of hemlock with water and caustic potassa, and obtained a fluid, which he neutralized with sulphuric acid, and redistilled; water only passed over, and a substance of the consistence of syrup remained in the retort. This was treated with strong alcohol, which precipitated sulphate of ammonia: the alcohol was then separated from the solution by distillation, and the residue being mixed with water and caustic potassa, and redistilled with a gentle heat, a colourless transparent oily-looking substance was procured floating on the water in the receiver. This being separated was found to possess properties of the most active kind: it was called *Conia* by Geiger.

Conia has a powerful odour, resembling that of hemlock and tobacco, and an extremely acrid bitter taste: it is soluble in water, has an alkaline re-action, and forms salts with the acids. According to Liebig, it is a compound of 66·91 of carbon, 12·0 hydrogen, 8·28 oxygen, and 12·8 of nitrogen. From xl. ℔. of the seeds Dr. Christison procured ℥ij.ss. of hydrated *Conia*. Dr. Christison made a series of interesting experiments on animals with this substance, which demonstrated that it operates with incredible energy on the nervous system, although its first influence is as a local irritant: it causes rapid paralysis, first of the voluntary muscles, then of the diaphragm and the respiratory muscles, and destroys by asphyxia. The heart remains unaffected. Few poisons equal Conia in subtilty and swiftness.[2]

Medical properties and uses.—Hemlock is a powerful narcotic, and is used as such both internally and as an external application. Stoerck, whose publications first brought it into

[1] *Pharmacologia*, p. 185.

[2] *Trans. of Roy. Soc. Edin.* vol. xiii.

general notice, rated its powers too high; and the multitude of discordant diseases which he enumerated as yielding to it, led many sober men to doubt its efficacy altogether. Hemlock is, nevertheless, a useful narcotic; and, if it have not succeeded in curing cancer in the hands of British practitioners, it has been advantageously used as a palliative in both scirrhous and open cancer, abating the pain, and allaying the morbid irritability of the system. It has also been found serviceable in chronic rheumatism; scrofulous, syphilitic, and other ill-conditioned ulcers, and glandular tumors; in pertussis, and the protracted cough which often remains after pneumonic inflammation. In America it has been used in bronchocele with advantage.[1] An over-dose of it produces sickness, vertigo, delirium, dilatation of the pupils, great anxiety, laborious respiration, coldness of the limbs, asphyxia.[2] The best antidote is vinegar, after the stomach has been evacuated, and the cerebral excitement reduced by bleeding and purging.

The powder of the dried leaves, if well preserved, and the extract, are the best forms of this remedy. Hufeland recommends the fresh expressed juice from ℳ xij. to ℳ lx. for a dose. The dose of the powder is grs. v. to grs. xxx.; that of the extract grs. v. to ℈j.: but both may be gradually increased every day, until a slight vertigo forbids the further increase. The Edinburgh and Dublin Colleges have long ordered a tincture, and it is now also admitted into the London Pharmacopœia.

Officinal preparations.—*Extractum Conii*, L. E. D. *Tinctura Conii*, L. E. D. *Unguentum Conii*, D. *Cataplasma Conii*, D.

CONVOLVULUS. *Spec. Plant. Willd.* i. 844.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Convolvulaceæ.

G. 323. *Corolla* bell-shaped, plaited. *Stig.* two. *Capsule* two-celled, each cell containing two seeds.

* *Stem twining.*

Sp. 4. *C. Scammonia.* Scammony. *Med. Bot. 3d edit.* 243. *t.* 86.

Sp. 61. *C. Jalapa.* Jalap. *Med. Bot. 3d edit.* 246. *t.* 87. *Ipomœa Jalapa. Redman Coxe.*

1. CONVOLVULUS SCAMMONEA.[3]

Officinal. SCAMMONIUM, *Lond.* SCAMMONIÆ GUMMI RESINA, *Edin.* CONVOLVULUS SCAMMONIA; GUMMI RESINA, *Dub.* Scammony.

Syn. Scammonée (*F.*), Scammonium von Aleppo (*G.*), Het Scammoneum (*Dutch*), Scammonea (*I.*), Escamonea (*S.* & *Port.*), Sukmunya (*H.* & *Arab.*).

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[1] *Journal of Med. and Phys. Science, Philadelphia*, i. 67.

[2] It is generally supposed that the poison administered to Socrates and Phocion was the expressed juice of Conium, but the effects, as described in the Phædon of Plato, do not accord with this opinion.

[3] Σκαμμωνια Dioscoridis.

This plant is a native of Syria, Mysia, Cappadocia, and Cochin China. It grows in abundance on the mountains between Aleppo and Latachea, and there the greater part of the scammony of commerce is obtained.[1] The root, which is perennial, is tapering, from three to four feet in length, and from three to four inches in diameter, covered with a light grey bark, and contains a milky juice. It sends up many slender twining stems, which extend from fifteen to twenty feet in length, adorned with arrow-shaped, smooth, bright green leaves, upon long footstalks. The flowers are in pairs upon the pedicles, consisting of a double calyx of four emarginated leaflets in each row; and a funnel-shaped, pale yellow, plaited corolla. The capsule is three or four-celled, containing small pyramidal seeds.

Scammony is obtained from the root of this plant[2]; and is collected in the beginning of June in the following manner. The ground is cleared away from the root, the top of which is then cut off in a sloping direction, about two inches below the place whence the stalks spring; and the milky juice which flows from it is collected in a shell fixed at the most depending part. Each root yields a few drachms only, which are drained off in about twelve hours. "This juice from the several roots is put together, often into the leg of an old boot, for want of some more proper vessel, where, in a little time, it grows hard and is the genuine scammony."—"The Jews," says Dr. Russel, "buy the scammony while it is soft, and mix it with the expressed juice of the stalks and leaves, with wheaten-flour, ashes, fine sand, or whatever else can answer their purpose." It is imported from Aleppo in what are called drums, which weigh from 75 to 125 lbs. each; and from Smyrna in cakes like wax, packed in chests. The former is light and friable, and is considered the best; that from Smyrna is more compact and ponderous, less friable, and fuller of impurities. The Smyrna scammony is said to be the juice of the *Periploca scammonium.*

Qualities.—Good Aleppo scammony is light, friable, and externally like a honeycomb. It has a peculiar, rather heavy odour, not unlike that of old ewe-milk cheese; and a bitterish, slightly acrid taste. The colour is bluish grey or dull olive, changing to dirty white or greenish yellow on lathering, when the surface of the mass is rubbed with the wet finger. The fracture is irregular, but smooth, faintly shining, and the sharp edges of the shivers are of a light grey colour, and

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1 *Russel's Nat. Hist. of Aleppo,* ii. 246.

2 No other part of the plant possesses any medicinal quality. *Russel.* l. c.

translucent. It is pulverulent; and the powder has a light grey colour. Its specific gravity is 1·235.[1] When it is of a dark colour, heavy and splintery, it should be rejected. When triturated with water, nearly one fourth of it is dissolved, and the solution appears slightly mucilaginous, opaque, and of a greenish grey colour. This solution is not affected by alcohol, solutions of acetate and diacetate of lead, nor sulphate of iron, nor is it precipitated by the acids; but with sulphuric acid it gives out the odour of vinegar. Solution of ammonia does not alter it, but that of potassa occasions a yellowish precipitate, which is quickly redissolved on the addition of an acid. Ether takes up two parts in ten of scammony, and when evaporated, leaves a brownish semi-transparent resin. Alcohol dissolves two thirds of its weight; but proof spirit is its best menstruum, taking up the whole except the impurities. *Aleppo* scammony contains, according to Bouillon la Grange and Vogel, 60 parts of resin, 2 of extractive, 3 of gum, and 35 of insoluble impurities. *Smyrna* scammony is usually in flat cakes, heavier, harder, and less pulverulent than the Aleppo: it contains 29 of resin, 8 of gum, 5 of extractive, and 58 of insoluble impurities. When these impurities consist of flour, sand, or ashes, they can be detected by dissolving the sample in proof spirit, as they sink and remain undissolved: but scammony is sometimes also adulterated with the expressed juice of cynanchum *monspeliacum;* and a fictitious scammony is also sold for the real, consisting of jalap, senna, manna, gamboge, and ivory black.

Medical properties and uses.—Scammony is a drastic cathartic, operating, in general, quickly and powerfully. The ancients were acquainted with its purgative qualities; and also employed it as an external application for removing hard tumours, itch, scurf, and fixed pains; but for the latter purposes it is now never used. It is a good purgative, in the torpid state of the intestines, in leucophlegmatic, hypochondriacal, and maniacal subjects; in worm cases, and the slimy state of the bowels to which children are subject; and as a hydragogue cathartic in dropsy. Scammony has been regarded by some as a cathartic of so irritating a nature, as to require to be corrected by exposing it to the fumes of sulphur, defæcating it with lemon-juice and other acids, and uniting it with demulcent mucilages; but except in an inflamed or very irritable condition of the bowels, it is a safe and efficacious purgative. It is, however, apt to gripe; on which account it is generally united with an aromatic, or a drop of some essential oil.

[1] *Brisson.*

The dose of scammony is from grs. v. to grs. xvj.; whether it be given in powder, or as a bolus, or in the form of mixture, triturated with almonds, gum, or extract of liquorice, and water.

Officinal preparations.—*Confectio Scammonii*, L. *Electuarium Scammonii*, D. *Pulvis Scammonii comp.* L. E. *Extractum Colocynthidis comp.* L. D.

2. IPOMŒA JALAPA.

Officinal. JALAPA, *Lond.* CONVOLVULI JALAPÆ RADIX, *Edin. Dub.* Jalap root.

Syn. Jalap (*F.*), Jalappenharz (*G.*), Jalapparot (*Swed.*), Scialappa (*I.*); Jalapa (*S.*).

The plant yielding jalap is a native of America, taking its name from Xalappa, a city of Mexico. The researches of Dr. Redman Coxe, of Philadelphia, have ascertained that it is an Ipomœa: Dr. Coxe has named it Ipomœa *Jalapa*.[1] It grows in a dry sandy soil, and flowers in August and September. The tuber is perennial, of an irregular egg-shape, externally of a dark brown colour, internally white, and, when fresh, abounding with a milky juice. It sends up many twining, round, twisted stems, of a light brown hue, which extend upwards of twenty feet, with smooth petiolated leaves, of a bright green colour, varying in shape, the upper being cordate, the lower angular, nearly hastate, oblong and pointed. The under surface of all the leaves is prominent and veined; and all are supported on foot-stalks the length of the leaf. The flowers are borne on axillary peduncles that send off two or three pedicels, each bearing a large, funnel-shaped, entire, plaited flower, of a lilac purple colour: with a calyx composed of five oval, concave, obtuse, pale green leaves, without bractes. The anthers are white, large, on long slender filaments; the style is longer than the filaments, the stigma capitate and simple, and the germen oval.[2]

The root of this plant, which is the jalap of the shops, was first brought to Europe about the year 1609 or 1610.[3] The

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[1] It is said to have been cultivated in England by Mr. Miller in 1668; and that a few years ago two specimens were in vigorous growth in Kew gardens, slips of the original plant introduced there by Mons. Thouin in 1778; but that these were the true jalap is doubtful.

A root of Ipomœa *Macrorhiza*, supposed to be the true jalap, was carried by Michaux, junior, in 1803, from the Botanic gardens of Charlestown to Paris, and planted there in the garden of the Museum of Natural History, where it now grows: it weighed 47 pounds and three quarters.—*Mémoires de l'Institut*, tom. vi. 387.

[2] Observations on the jalap plant, by *John Redman Coxe, M.D.*, p. 9. I take this opportunity of publicly thanking Dr. Coxe for his polite attention in sending me a live tuber of the true jalap plant. It is remarkable that the College of Physicians should have referred to a MS. of Professor Don, in the present edition of the London Pharmacopœia, when Dr. Coxe's pamphlet has been before the profession since 1830.

[3] *Bauhin Prodromus*, 135.

best comes from Vera Cruz in transverse slices, and also in egg-shaped, pointed, entire tubers, covered with a very thin, wrinkled, brown cuticle. That which is sliced is more liable to be adulterated, which is said to be sometimes done with slices of briony root; but the fraud is easily discovered by the spongy texture and whiter colour of the latter, and its burning less readily when applied to the flame of a candle.

Qualities.—Good jalap root has a sweetish, heavy odour when broken, and a sweetish, slightly pungent taste. It is heavy, compact, and hard, with a shining resinous fracture, which shows the internal part of a yellowish grey colour, interspersed with deep brown concentric circles. It is pulverulent, affording a powder of a pale brownish-yellow colour. Both water and alcohol, separately, extract a part; and when mixed, take up the whole of the active constituents of jalap. Ether dissolves three parts of ten submitted to its action; and affords, when evaporated over water, a transparent insipid resin, and some extractive; but, according to Cadet, the ether takes up only a *soft* resin, and leaves a *hard* resin. Hence jalap appears to contain a soft and a hard resin, starch, extractive, and ligneous matter.[1] M. Henry gives the following as the result of his examination of several specimens of jalap found in France;—

		Extract.	Resin.	Residue.
Jalap leger,	—	75	60	270
sain,	—	140	48	210
piqué,	—	125	72	200

Medical properties and uses.—Jalap is a stimulant cathartic, acting briskly on the bowels; and although occasionally griping severely, yet safe and efficacious. It is used in the same cases as scammony, whenever it is required effectually to evacuate the intestines; and as a hydragogue purgative it is supposed to possess singular efficacy. It has been asserted that it proves hurtful in hypochondriasis, bilious habits, and fevers, except of the intermittent kind; but Dr. Hamilton used it in all these instances, in typhus, and the exanthemata, with the best effects.[2] The watery extract purges moderately without griping, and is therefore well adapted for children; but the alcoholic scarcely at all purges, although it occasions the most violent tormina and gripings. It is frequently triturated with hard sugar, which renders its powder finer, and increases its activity; and with other cathartics, especially sulphate of

[1] Mr. Hume supposed he had discovered a peculiar principle in jalap, which he termed *Jalapine*; but his experiments require to be confirmed.—*Lond. Med. & Phys. Journal*, April 1824.

[2] *Observations, &c. on Purgative Medicines*, 8vo. *passim.*

potassa, by which the action of both is reciprocally improved. In dropsical affections, the bitartrate of potassa is a useful addition; and in the cachexiæ and worms it may be united with calomel, the operation of which it greatly quickens.

The dose is from grs. x. to ʒ ss. in powder, pills, or bolus; with a drop or two of essential oil to prevent griping.

Officinal preparations.—*Pulv. Jalapæ comp.* L. E. *Pulvis Scammonii comp.* L. *Extractum Jalapæ,* L. E. D. *Tinctura Jalapæ,* L. E. D. *Tinct. Sennæ comp.* E.

CONTRAJERVÆ RADIX. Vide *Dorstenia Contrajerva.*

COPAIFERA. *Spec. Plant. Willd.* ii. 630.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

G. 880. *Calyx* none. *Petals* four. *Legume* ovate. *Seed* one, with an ovate arillus.

Species 1. C. *Langsdorffii.* Copaiva tree. *Med. Bot. 3d edit.* 609. *t.* 216. *De Candolle.*

Officinal. COPAIBA, *Lond.* COPAIFERÆ OFFICINALIS RESINA, *Edin.* RESINA LIQUIDA, *Dub.* Copaiba Balsam.

Syn. Beaume de Copahu (*F.*), Kopaiva Balsam (*G.*), Hwit Indiansk Balsum (*Swed.*), Balsam Copayve (*Dutch*), Balsamo del Copaiba (*I.*), Copayva (*S.*).

The copaiba tree is a native of South America and the Spanish West India islands. It grows in great plenty in the woods of Tolu, near Carthagena, and in those of Quito and Brazil. It is a lofty handsome tree, branching at the top, with a brownish ash-coloured bark. The leaves are large and pinnate, consisting of four pair of ovate, pointed, alternate, ferruginous leaflets, with a terminal one, two or three inches long, entire, shining, veined, narrower on one side than on the other, and placed on short petioles. The flowers are in terminal racemes, which are stiff, spreading, the length of the pinnæ, and loosely divided into eight alternate common peduncles, with the flowers, which are white, sitting closely on them. The petals are oblong, acute, concave, spreading; the filaments slender, incurved, bearing oblong incumbent anthers; and the germen roundish, compressed, and on a short pedicel. The fruit is an oval two-valved pod, containing a single egg-shaped seed, enveloped with a berried arillus.

Almost all the species of Copaifera[1] yield Copaiba: but the greatest quantity is furnished by C. *Multijuga,* a tree growing in the province of Para. The Copaiba of the shops is procured by wounding or boring these trees to the pith, near the base of the trunk, when it flows abundantly[2], in the form

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[1] Those known and described are C. *Guaianensis,* C. *Langsdorffii,* C. *Beyrichii,* C. *Martii,* C. *Multijuga,* C. *bijuga,* C. *nitida,* C. *laxa,* C. *cordifolia,* C. *Sellowii,* C. *oblongifolia,* C. *Iacquinii.*

[2] "Tanta quantitate distillat, ut spatio trium horarum ad lb. xij. effundat." *Piso. Nat. Hist.* 56.

of a clear colourless liquid, which is thickened, and acquires a yellowish colour, by age. The operation is performed two or three times in the same year; and, from the older trees, the best Copaiba is obtained. It is brought to this country from the Brazils, in small casks, each of which contains from one cwt. to one cwt. and a half of the balsam.[1] But another kind comes from the West Indies, and is supposed to be the product of C. *Iacquinii.*[2]

Qualities.—Genuine good Copaiba has a peculiar but not disagreeable odour, and a bitterish, hot, nauseous taste. It is clear and transparent; its consistence is that of oil[3], the colour a pale yellow, and its specific gravity 0·950 to 0·966; but when it is exposed with an extended surface to the action of the air, it gradually thickens, until at length it becomes solid, dry, and brittle like resin. It is insoluble in water, but is completely soluble in alcohol and ether. Sulphuric acid converts it into a brown bituminous-like mixture, which gives out a strong odour of sulphur. Nitric acid, in the ordinary heat of the air, partially dissolves it, and renders it brown; but, at an increased temperature, the action is violent, the acid is decomposed, and nitrous fumes are copiously emitted. The muriatic and acetic acids scarcely affect it. The pure alkalies form with it white saponaceous compounds, which are soluble in water, forming opaque milky mixtures. It is soluble, also, in the expressed oils. Distilled with a gentle heat, 38 per cent. of a green, pleasantly odorous, sapid, volatile oil, of sp. gr. 876, passes over, while 7·59 remain in the distilled water, and 53·66 of a brown resinous extract remain in the retort, which gradually harden and become brittle, 52 parts of which are inodorous, insipid, and soluble in ether and alcohol, and 1·66 remains clammy: the remaining 0·75 are extractive. Gerber says, that recent Copaiba yields 41 per cent. of volatile oil, and old Copaiba only 31·07 per cent. In destructive distillation it yields some empyreumatic brownish red oil, an acidulous water, carbonic acid gas, and olefiant gas, but does not yield benzoic acid. Hence it approaches in its nature to the turpentines. It is sometimes adulterated with mastich and oil, and occasionally with rape oil and with castor oil. Bucholz remarks, that if copaiba does not dissolve completely in a mixture of four parts of alcohol and one of rectified sulphuric ether, its adulteration may be inferred. The adulteration with castor oil is discovered by mixing three

[1] The first notice of this balsam was given by Maregrav and Piso in 1648.
[2] *Supplement to the Edin. New Dispens.*, p. 46.
[3] The adulterated balsam, which Lewis mentions as being thick, white, and opaque, with a quantity of turbid watery liquor at the bottom, is not now to be found.

parts of the suspected balsam with one part of sulphuric acid; if it be pure, a plastic reddish mass will be formed: if it contain castor oil, the consistence is that of turpentine, and it is scarcely coloured. An easier mode is to agitate, in a bottle, one part of liquor ammoniæ with two and a half of copaiba; if the mixture remain cloudy, after standing at rest for some time, it contains castor oil. If copaiba balsam be pure, it rapidly solidifies when mixed with calcined magnesia: if this be not effected, the balsam is impure, and contains a fixed oil.

Medical properties and uses.—Copaiba is stimulant, diuretic, and gently purgative. It has been recommended in pulmonary complaints; but where the excitement is morbidly increased, or there is any degree of the inflammatory diathesis present, the heating and irritating quality of copaiba renders it injurious. From its power of stimulating the urethra, it is more successfully used in gleets. It is equally efficacious in fluor albus, and in that state of the uterus sometimes occurring on the final cessation of the menses, which is accompanied with a sanious discharge, great bearing down, and many of the symptoms of incipient cancer. It certainly affords considerable relief in hæmorrhoidal affections; perhaps from its exciting the steady peristaltic motions of the intestines, at the same time time that the determination of the blood to the hæmorrhoidal vessels is lessened by the stimulant effect of the remedy on the kidneys. In too large doses, it excites inflammation of the kidneys, and its use should always be avoided when ulceration of these organs is suspected.

The resin remaining after distillation by a gentle heat has been recommended by M. Thorn, as acting as efficaciously in gonorrhœa and gleets as the simple copaiba, without its nauseating properties.[1] But, if this residue possess any influence, it must be imputed to some of the volatile oil remaining in it, as the pure resin is inert.

The dose of copaiba is from ♏ x. to f ʒ j., twice or thrice a day, either triturated with sugar into an oleo-saccharum, or mixed with soft or distilled water, by means of mucilage or the yolk of an egg. The dose of the volatile oil is ♏ xx.

CORIANDRUM. *Spec. Plant. Willd.* i. 1448.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 552. *Corolla* radiate. *Petals* inflex-emarginate. *Involucre* universal one-leafed. The partial ones halved.

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[1] *Thorn, Obs. on the Treatment of Gonorrhœa,* &c. Lond. 1827.

Species 1. C. *sativum.*[1] Common Coriander. *Med. Bot. 3d. edit.* 137. *t.* 53. *Smith, Flor. Brit.* 320. *Eng. Bot.* 67.

Officinal. CORIANDRUM, *Lond.* CORIANDRI SATIVI SEMINA, *Edin. Dub.* Coriander seed.

Syn. Coriandre (*F.*), Koriandor saamen (*G.*), Koriander (*Dutch, Swed. & Dan.*), Koryander (*Pol.*), Coriandro (*Port.*), Coriandro (*I.*), Semilla de Cilantro (*S.*), Cottamillie (*Tam.*), Mety (*Malay*), Kezereh (*Arab.*), Kitnuz (*Pers.*), D'hanya (*H.*), D'amyáca (*San.*).

This plant is an annual, a native of Italy; but is now found wild in some parts of this country[2], owing to the abundant cultivation of it for medicinal purposes. It flowers in June, and ripens its seed in August. The stem is erect, about two feet in height, branching, divaricated, round, smooth, and obscurely striated. The leaves are compound; the lower ones pinnated, with gashed, wedge-shaped, somewhat roundish leaflets, and the upper thrice-ternate, with linear-pointed segments. Both the umbels and umbellules are many-rayed; with an involucre of one linear leaf, and involucels of three lanceolate narrow leaves, all on one side. The flowers are of a white or reddish colour. The calyx consists of five leaves; the petals are five also, oblong, and inflected at the tips, but those of the flowers of the circumference have the outermost petals larger, and not inflected. The fruit is globular, obscurely ribbed, and divisible into two concave hemispherical seeds with large interior vittæ; and this form of the fruit distinguishes coriander from all the other species of umbelliferæ. The whole plant, when green, has an abominably fœtid odour if bruised, which extends even to the fruit.[3]

Qualities.—The dried seeds have a grateful aromatic odour, and a moderately warm pungent taste; qualities which depend on an essential oil, that can be obtained separate by the distillation of the seeds with water. Their active principles are completely extracted by alcohol, but only partially by water.

Medical properties and uses.—These seeds are carminative and stomachic. They are sometimes used in flatulencies; but principally to cover the unpleasant taste, and correct the griping quality, of some cathartics. The dose is ℈ j. to ʒ j., bruised.

Officinal preparations.—*Aqua Calcis comp.* D. *Confectio Sennæ,* L. E. *Infusum Sennæ cum Tamarindis,* E. *Tinct. Sennæ comp.* E.

CORNU. Vide *Cervus Elaphus.*

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[1] Κοριαννον, Dioscoridis.

[2] About Ipswich, and some parts of Essex. *Smith.* It is also found near the Red House, Battersea.

[3] Hence, Alston imagined that the name of the plant comes from κορις, a bug. —*Mat. Med.* ii. 349.

CREASOTON. *Lond.* Creasote.[1]

This substance, now introduced into the list of Materia Medica of the London College, is prepared from the oil of wood tar. Carbonate of potassa is first added to the oil, to free it from some acetic acid; after which the acetate is separated by distillation. Some phosphoric acid is then added to the product to neutralize ammonia, and it is distilled a second time. What comes over is mixed with a strong solution of potassa, which combines with the creasote: this compound is then neutralized by sulphuric acid, and the oil which separates, after being distilled, is impure creasote. It is purified by repeatedly treating it with potassa, and as frequently redistilling.

Qualities.—Creasote, when pure, is a colourless limpid liquid, having a sp. gr. of 1·037. It has a hot pungent taste, which leaves a degree of sweetness on the palate: its colour resembles that of impure pyroligneous acid, or smoked meat. It is soluble in 80 parts of water: and in every proportion in alcohol and ether. It unites with chlorine, iodine, bromine, sulphur, the alkalies, and the earths; but the latter compounds are decomposed by weak acids. It is a compound of carbon, hydrogen, and oxygen in unknown proportions.

Medical properties and uses.—Creasote is a powerful stimulant. In large doses it is destructive to animal life; and even its aqueous solution kills fish, insects, and plants. It has been administered, internally, in cases of anorexia, and affections of the stomach depending on atony of the organ, but its chief value consists in its powerful influence in relieving rheumatic and neuralgic pains, when it is externally applied. It has also been used with advantage pinorrigo *scutulata.*

The dose is from ♏vj. to ♏ xv. in a glassful of water, or any bitter aqueous infusion.

CRETA. Vide *Calx.*

CROCUS. *Spec. Plant. Willd.* i. 194.

Cl. 3. *Ord.* 1. Triandria Monogynia. *Nat. ord.* Irideæ.

G. 92. *Corolla* six-parted, equal. *Stigma* convoluted.

Species 1. C. *sativus.*[2] Common Saffron. *Med. Bot. 3d edit.* 763. *t.* 259. *Miller's Gard. Dict. Smith, Flora Brit.* i. 39. C. *autumnalis.* C. *officinalis, Mart. Fl. Rust. t.* 58. *Eng. Bot. t.* 343.

Officinal. CROCUS, *Lond.* CROCI SATIVI STIGMATA, *Edin. Dub.* The stigmas of the Saffron.

Syn. Saffran (*F.*), Safran (*G. &Dan.*), Saffran (*Dutch & Swed.*), Zafferano (*I.*), Azafran (*S.*), Açafrao (*Port.*), Szafran (*Pol.*), Khoongoomapoo (*Tam.*), Zafran (*Arab.*), Abeer (*Pers.*), Safaron (*Malay*), Khohom (*Cyng.*), Cashmeerum (*Sans.*).

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[1] Named from χρεάs, flesh, and σωζω, I save, on account of its preserving meat.

[2] Κροκος Dioscoridis. Its English name is derived from the Arabic Sapharan. *Celsus.* See *Alston's Lectures,* ii. 119.

Common saffron is a perennial bulbous plant, found wild in some parts of this country, which affords reason for supposing it to be indigenous; but it is probable that it was originally brought from Greece or Asia. It is cultivated for medicinal use, in great abundance, in Cambridgeshire and Essex. Formerly, it was chiefly grown at Saffron Walden, but it is now confined to Stapleford. It flowers in September. The bulb is solid and depressed. The flower, which appears before the leaves, is sessile on the bulb, of a violet or lilac colour, and raised on a long slender white tube. The leaves are linear, a little revolute, of a deep rich green colour, with a white nerve in the centre, and enclosed with the tube of the flower in a membranous sheath. The corolla is parted into six nearly elliptical segments; the stamens are shorter than the corolla, and erect; and the style, which is the length of the corolla, hangs out at one side between the segments. The stigma is deeply three-parted, of a rich orange-colour, pendulous, and odorous; with the segments linear-involute at the margin, and crenate at the apex. The flower never varies.

For the preparation of the saffron, the flowers are gathered early in the morning, just as they are about to blow. They are then spread upon a table, and the stigmas, with a proportion of the style, carefully picked out of the flower, which is thrown away as useless. The stigmas are then dried upon a portable kiln of a peculiar construction, over which a hair-cloth is stretched, and over it several sheets of white paper are laid; upon which the wet saffron is spread between two and three inches thick. It is now covered with other sheets of paper, and over them is laid a coarse blanket, five or six times doubled, which is pressed down with a board and a large weight after the fire is lighted. The first heat is strong, to make the saffron sweat; and, after an hour, when it is intended to form the saffron into a cake, it is turned, and the same degree of heat continued for another hour. The fire is then reduced to a moderate heat, which is kept up for twenty-four hours, during which time the cake is turned every half hour, so as to dry it thoroughly. It is then fit for the market. The finest saffron is not formed into a cake, but consists of the stigmas dried; and thence it is termed *hay* saffron.

In the shops, is found saffron from Sicily, France, and Spain, besides the English. The Spanish is generally spoiled with oil, in which it is dipped with the intention of preserving it; the Sicilian and French saffron is better than the Spanish; but the English, as being fresher, more genuine, and better cured, is always preferred. It is sometimes adulterated with fibres of smoked beef, the petals of the safflower (*Carthamus* *tinctorius*), and of officinal marigold (*Calendula officinalis*); or saffron, from which tincture or infusion has been drawn, is mixed with a little good saffron, and again pressed into a cake. These frauds are detected by infusing the suspected saffron in hot water, when the expanded stigmas will be easily distinguished from the florets of the other flowers; and the deficiency of the presence of colour and odour, or an unpleasant odour arising when the saffron is thrown upon red-hot coals, will indicate the presence of the other fraudulent ingredients. It should be chosen fresh in hay, or in close, tough, compact cakes, moderately moist, and possessing, in an obvious degree, all the under-mentioned sensible qualities: the not staining the fingers but making them oily, its exhaling a musty flavour; a whitish yellow or a blackish colour indicate that it is bad, or too old.

Qualities.—Good saffron has a sweetish, penetrating, diffusive odour; a warm, pungent, bitterish taste; and a rich deep orange-yellow hue in the hay, or an orange-red colour in cake. It yields its colour and active ingredients to water, alcohol, proof spirit, wine, vinegar, and, in a smaller degree, to ether. By distillation with water it affords a small quantity of a heavy golden-yellow coloured volatile oil; and it is to this oil that saffron owes its active properties: 32 parts of saffron yield one of oil. The watery infusion, which has a deep orange-colour, is rendered, when much concentrated, of a very deep purple by strong sulphuric acid, the mixture emitting the smell of vinegar, and yielding a copious black precipitate when diluted with water: chlorine produces a copious yellow precipitate, the liquid retaining only a very pale lemon-colour. Saffron seems to contain chiefly extractive, which, according to Hermbstadt, is nearly pure[1], and in the proportion of ten parts in sixteen of the vegetable; but M. Henry has demonstrated that it contains volatile oil; and he contends that its stimulant influence is dependent on this oil: the remainder being chiefly ligneous fibre. I have found that it contains resin also; for sulphuric ether digested on saffron is coloured, and when evaporated on the surface of water, a pellicle of resin is left, whilst the coloured extractive, which is taken up with the resin, is dissolved in and colours the water.[2]

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[1] This extractive, when pure, is named polychroite by Bouillon la Grange and Vogel, on account of the different colours it is capable of assuming when it is acted on by sulphuric acid, which changes it to indigo, which gradually becomes lilac: nitric acid gives it a green hue. Vide *Ann. de Chim.* lxxx. p. 186.

[2] Chymists assert, that extractive is insoluble in ether; but I find that when resin also is present in any vegetable matter, ether is capable of taking up some extractive combined with the resin which it dissolves; and when the ethereal

Medical properties and uses.—Saffron is regarded as a stimulant and antispasmodic; but, from the experiments of Dr. Alexander[1], its powers appear to be inconsiderable. It was known to the ancients, who considered it as a remedy of great activity; in moderate doses exhilarating the spirits, easing pain, and producing sleep; but occasioning headachs, coma, delirium, convulsive laughter, and even fatal effects, when given in large doses. In modern practice, however, it is scarcely ever given except as a cordial adjunct to more active remedies. The dose in substance is from grs. x. to ʒ ss.; but it has been given in much larger doses without any sensible effect being produced.

Officinal preparations.—*Syrupus Croci*, L. *Confectio aromatica*, L. D. *Pil. Aloes cum Myrrha*, L. *Pilula Styracis comp.* L. *Pilulæ Styrace*, D. *Tinctura Croci sativi*, E. *Tinct. Aloes comp.* L. E. D. *Tinct. Cinchonæ comp.* L. D. *Tinct. Aloes*, D. *Tinct. Rhei comp.* L. *Decoctum Aloes comp.* L. D.

CROTON. *Spec. Plant. Willd.* iv. 531.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Euphorbiaceæ.
G. 1718. *Male.* *Calyx* cylindrical, five-toothed. *Corolla* five-petalled. *Stamens* 10—15.
Female. *Calyx* many-leaved. *Corolla* none. *Styles* three, bifid. *Capsule* three-celled. *Seed* one.
Species 43. C. *Cascarilla, Don. Ed. Phil. Journ.* C. *Eleutheria, Med. Bot.* 3d *edit.* 633. *t.* 223. *Sloane's Jamaica*, vol. ii. t. 174.
Species 36. C. *Tiglium.* Purging Croton. *Flor. Zeyl.* 343. *Rumph. Amboyn.* iv. p. 98. *t.* 42. *Rheede Malab.* ii. p. 61. *t.* 33. *Ray, Hist. Plant.* 167. *Ainslie's Mat. Med. of Hindustan*, 4to. pp. 96. 291. *Med. Bot.* 3d *edit.* vol. v. p. 71.

1. CROTON CASCARILLA[2]?

Officinal. CASCARILLA, *Lond.* CASCARILLÆ CORTEX, *Dub.* CROTON ELEUTHERIÆ CORTEX, *Edin.* Cascarilla bark.

Syn. Cascarille (*F.*), Cascarillrinde (*G.*), Kaskerilla (*Dutch*), Kaskarillo (*Dan.*), Kaskarilla (*Belg.*), Caskaril (*Swed.*), Cascariglia (*I.*), Chacarilla (*S.*), Cascarilha (*Portug.*), Szakaryla (*Russ.*).

This tree is a native of the Bahama islands, and has been found in Jamaica by Dr. Wright: it grows also in St. Domingo. It is a small tree, seldom exceeding twenty feet in height, and branching thickly towards the top. The more

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tincture is evaporated on the surface of water, these principles are separated, the resin remaining in the form of a pellicle on its surface, whilst the extractive is dissolved, colours the water, and forms, with the solution of muriate of tin, a brown flaky precipitate. Hence ether is a good test of these vegetable principles.

[1] *Experimental Essays*, p. 88.

[2] Notwithstanding the adoption of Mr. Don's opinion, it is doubtful whether the C. *Cascarilla* furnishes the bark. This is the wild rosemary of Jamaica; but Cascarilla comes from the Bahamas.

tender branches, when broken, ooze out a thick balsamic liquor. The leaves are alternate on short petioles, ovate or cordate, lanceolate, and elongated towards the apex, which is blunt, entire, and, on the upper surface, of a bright green colour. The flowers are in axillary and terminal racemes. The petals are whitish, oblong, obtuse, and spreading. The male flower has ten subulate filaments, supporting erect compressed anthers; the female produces a roundish germen, crowned with three bifid spreading styles, with obtuse stigmas, The capsule is superior, trilocular, and contains a solitary shining seed.

Cascarilla bark is imported chiefly from Eleutheria, one of the Bahama islands, packed in chests and bales. It consists of pieces about six or eight inches long, scarcely one tenth of an inch thick, quilled, and covered with a thin epidermis, beset with lichens, particularly Graphides[1], which give the bark a snowy whiteness on the surface.

Qualities.—Cascarilla bark has a pleasant spicy odour, and a bitter, warm, aromatic taste. The colour of the inside of the pieces is a reddish cinnamon hue, and their fracture close and short, of a dark reddish brown or purple colour. It is very inflammable, and is easily distinguished from all other barks by emitting, when burnt and extinguished, a fragrant smell, resembling that of musk, but more agreeable. Its active constituents are partially extracted by alcohol and water, and completely by proof spirit. Ether takes up one and a half in ten parts; and, when evaporated on the surface of water, leaves a thick pellicle of bitter resin; and, dissolved in the water, a small portion of almost colourless pungent extractive. According to Tromsdorff, who analyzed it, 4696 parts yielded the following products:—Mucilage and bitter principle 864, resin 688, volatile oil 72, water 48, and woody fibre 3024 parts.[2] The ethereal tincture shows extractive also to be present, of a greenish yellow colour, very fragrant and pungent. Proof spirit is its proper menstruum.

Medical properties and uses.—This bark is a valuable carminative and tonic. It was introduced into practice as such in 1690 by Professor Stisser; and was afterwards much used in Germany, particularly by the Stahleans, as a substitute for cinchona bark in the cure of intermittent and remittent fevers[3]; but although they over-rated its virtues, yet it is an

[1] The species mentioned by M. Fee are, G. *tortuosa*, G. *packnades*, G. *Cascarillæ*, G. *lineola*, G. *Serpentina*, G. *Caribæa*, G. *Afzelii*.

[2] *Annales de Chimie*, xxii. 219.

[3] It was formerly often sold for the Peruvian bark, and hence was called *Kina kina aromatica*, *Cortex Peruvianus grisseus*, *China china fœmina*, *China china spuria*, *Cortex china nova.*

excellent adjunct to the bark in these diseases: rendering it, by its aromatic qualities, more agreeable to the stomach, and increasing its powers. It is successfully employed in dyspepsia, asthma, and flatulent colic: the latter stage of dysentery, and diarrhœa, particularly when occurring after measles; and in the gangrenous thrush peculiar to children.[1] The dose of the powdered bark is from grs. xij. to ʒ j. three or four times a day.

Officinal preparations.—*Infusum Cascarillæ*, L. *Tinctura Cascarillæ*, L. D. *Extractum Cascarillæ*, D.

2. CROTON TIGLIUM.

Officinal. TIGLII OLEUM, *Lond.* OLEUM EX SEMINIBUS EXPRESSUM, *Dub.* Oil of Croton, or Tiglium.

Syn. Huile de Croton (*F.*),—— Nervallum cottay unnay (*Tam.*), Iummal Gota (*Duk.*), Nepala (*Sans.*), Naypulum vittilo noonay (*Telingoo*), Dund (*Pers.*), Batoo (*Arab.*), Beri (*Malay*).

The plant yielding the seed from which this oil is expressed is a native of the Molucca islands, and of the greater part of the peninsula of India. It has an arboreous stem, covered with a soft blackish bark. The leaves are alternate, ovate-acuminate, serrated and smooth, with two glands seated at the base; they are supported on petioles shorter than the expansion of the leaf. The flowers are in erect terminal racemes, with downy pedicels. The seeds, which are contained in trilocular capsules, are oblong, about the size of a large coffee-bean, four-sided, flattish on two sides, and convex on the other, with four elevated ridges, running at equal distances from the base to the apex of the seed. The shell of the seed is black; but covered with a soft pale yellowish brown epidermis. The seeds abound in oil.

Croton seeds are imported into this country in cases; and, owing to the rubbing of the epidermis, when the cases are not completely filled, have generally a mouldy appearance. In this state they were formerly known in Europe under the name of *Molucca grains;* but as they were discarded from medical practice on account of their very drastic effects, arising from the imprudent manner in which they were exhibited, they ceased to be an article of commerce, until 1820, when the expressed oil was introduced by Mr. Conwell as a purgative: 100 parts of the kernels of the seeds when bruised yield 60 of acrid oil, and 40 of farinaceous matter. The acrid principle resides chiefly in the testa or skin of the cotyledons and the corculum or embryon, and is mixed with the oil of the cotyledons in its expression. The goodness of the oil,

[1] *Underwood, Diseases of Children,* 4th edit. i. 79.

therefore, depends on the seeds being shelled before they are bruised. In India the seeds are prepared for medicinal use by slightly roasting them, which enables the testa to be readily separated. One or two grains act as a powerful cathartic. One hundred parts of the seeds consist of 36 parts of testa and 66 of kernel. The kernel yields 60 per cent. of oil.[1]

Qualities.—Croton oil is of a pale reddish yellow colour. Its taste is hot and acrid; and it leaves an uneasy feeling in the mouth and throat, which continues for many hours. Even a minute portion of the kernel of the seed, when chewed, leaves a hot pungent sensation on the tongue, which remains for twenty-four hours. The oil is wholly soluble in ether and oil of turpentine. Alcohol takes up two parts out of three, and the solution possesses the acrimony and the cathartic properties of the oil, whilst the undissolved portion is devoid of acrimony, and inert when taken into the stomach. But much of what is taken up by the alcohol is fixed oil: and, from the experiments of Dr. Nimmo, croton oil is composed of 45 parts of an acrid principle, which is a compound of a resin and an acrid volatile acid, which M. Brandes has named *Crotonic* acid, and 55 of fixed oil, resembling the oil of olives.

Dr. Nimmo has suggested the following means of detecting adulterations of croton oil:—Pour into a phial, the weight of which is known, 50 grains of the oil; add alcohol, which has been digested on olive oil; agitate well; and, having poured off the solution, add more alcohol of the same kind until the dissolved portion is diffused in such a proportion of the alcohol that each half-drachm measure shall contain equal to one dose of the croton oil for an adult;—by placing the phial near a fire, to evaporate what remains of the alcohol in the bottle, if the remainder be to that abstracted by the alcohol as 55 to 45, the oil is genuine. If it be adulterated with any fixed oil the residuum will be larger; if with castor oil it will be smaller than in the genuine oil.[2]

Medical properties and uses.—Croton oil is a powerful hydragogue purgative, operating in a very short time after it is taken. It has been given with great advantage in cases of obstinate constipation, convulsions, mania, apoplexy, and other diseases which require, along with the complete evacuation of the intestines, the lessening the circulating mass. The smallness of the dose in which this oil produces its effects requires the greatest caution to be observed in its administration, as it has

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[1] *Nimmo.*

[2] *Journ. of Science,* vol. xiii. pp. 66—69.

occasionally induced the most dangerous hypercatharsis. In India, where it has long been used, ghee or butter, with orange or rice-water or cold butter-milk, and the external affusion of cold water, are employed to counteract its too violent effects, when these occur. It is also used in India as an emmenagogue with excellent effects; and as an external application in rheumatic affections.[1] Diluted with two parts of olive oil, it produces an eruption of small pustules on the skin, and thence operates as a counter-irritant. In some instances the undiluted oil is used for this purpose.

Croton oil is generally administered in doses of from one to two, and in some cases five drops, made into pills with crumb of bread; or combined with mucilage of gum, sugar, and almond mixture, in the form of emulsion. Dr. Nimmo recommends the saturated alcoholic solution, in the dose of f ʒ ss. rubbed up with simple syrup, and mucilage of gum, of each ℥ ij., and ℥ iv. of distilled water.[2]

CUBEBA. Vide *Piper Cubeba.*

CUCUMIS. *Spec. Plant. Willd.* i. 611.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Cucurbitaceæ.
G. 1741. *Male. Calyx* five-toothed. *Corolla* five-parted. *Filaments* three.
Female. Calyx five-toothed. *Corolla* five-parted. *Pistil* three-cleft. Seeds of the *gourd* argute.
Sp. 1. C. *Colocynthis.*[3] Bitter Cucumber. *Med. Bot. 3d edit.* 189. *t.* 71.

Officinal. COLOCYNTHIS, *Lond.* CUCUMERIS COLOCYNTHIDIS PULPA, *Edin.* COLOCYNTHIS; FRUCTUS PULPA, *Dub.* The pulp of Coloquintida, or Bitter Cucumber.

Syn. Coloquinte (*F.*), Koloquinten (*G.*), Koloquint (*Dutch, Dan. & Swed.*), Coloquintida (*I.*), Pepinero Coloquintida (*S. & Portug.*), Hunzil (*Arab.*), Indráini (*H.*), Indraváruni (*San.*), Makkul (*Ben.*), Peycoomutikai (*Tam.*), Dahuk (*Egypt.*).

This plant is an annual, a native of Turkey and Nubia[4], flowering from May till August, and much resembling the cucumber in its herbage. The root is branching, and strikes deep into the ground. The stems are trailing, beset with rough hairs; the leaves are on long petioles, of a triangular form, variously sinuated, obtuse, of a fine green colour on the upper surface, and whitish and rough beneath. The flowers are solitary, axillary, and of a yellow colour. The calyx of

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[1] *Mat. Med. of Hindostan,* 4to. Madras, 1813. The solution of the oil in oil of turpentine produces a pustulous eruption when it is applied to the skin.

[2] *Journ. of Science,* vol. xiii. p. 69.

[3] Κολυκυνθις Dioscoridis.

[4] Burckhardt, in his Travels through Nubia, 4to, p. 184., says, "The ground was covered with the coloquintida, a plant very common in every part of this desert (Wady Om-gat)."

the male flowers is bell-shaped; the corolla the same shape with the limb, divided into five-pointed segments; and the anthers, which stand on three short filaments, are long, erect, and adhere together on the outer side. The female flower is like the male, but the filaments have no anthers. The fruit is a round berry or pepo, the size of a small orange, yellow, and smooth on the outside when ripe; trilocular, each cell containing many ovate, compressed, whitish seeds, enveloped by a white spongy pulp.

When the fruit is ripe and yellow, it is peeled and dried in a stove; and in this state it is brought to this country. When it is larger than a St. Michael's orange, and has black acute-pointed seeds, it is not good.

Qualities.—Dried coloquintida is inodorous; but has an extremely bitter nauseous taste, and the pulp feels mucilaginous when chewed. Independent of the seeds, it is altogether composed of a very light, easily torn, white, cellular matter. Ether, alcohol, and water extract its virtues. The infusion in boiling water has a golden-yellow colour, gelatinizes as it cools, and resembles, except in colour and taste, mucilage of quince-seed. This mucilage is soluble in cold water. Alcohol and all the acids coagulate the solution, which is precipitated by solutions of acetate and subacetate of lead, and nitrate of silver. Sulphate of iron strikes with it a deep olive colour.

Its colour is rendered also greenish by solution of potassa, which precipitates it: but the mucilage is dissolved by solution of ammonia. Ether, digested on the pulp, deposits, when evaporated on the surface of water, a white, opaque, bitter resin, and some extractive; from which the water acquires the bitter taste of the fruit, and precipitates solutions of potassa, nitrate of silver, and acetate of lead. From these experiments colocynth pulp should consist chiefly of mucus, resin, a bitter principle, and some gallic acid. M. Vauquelin found that an alcoholic tincture formed from the residue of a strong decoction of colocynth, when evaporated and washed with a little water to free it from some acetate of potassa, yields a brittle orange-yellow substance, partially soluble only in water, the residue being a white filamentous mass, changing to yellow. This substance he has named *Colocynthine;* and he regards it as the active principle of the drug.[1] Colocynthine is more soluble in alcohol than in water. It is precipitated by infusion of nutgalls.

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[1] *Journ. de Pharm.* 1824, p. 416.

Medical properties and uses.—The pulp of this fruit is a very powerful drastic cathartic. It was employed by the ancients in dropsical, lethargic, and melancholic affections; but always with caution, on account of its violent effects. Orfila, from his own observations, asserts that one or two drachms of it only, applied to the cellular tissue of the interior of the thigh of a man, produced death in the space of twenty-four hours.[1] When given alone, even in moderate doses, it purges vehemently, producing violent gripings, bloody dejections, and, not unfrequently, convulsions and inflammation of the bowels. The watery decoction, or the infusion, is much less violent in its operation, and has been recommended in worm cases. It is scarcely ever given alone in any form, but is generally united with other purgatives to quicken their operation. The dose is from gr. j. to grs. v. triturated with almonds, or gum, or some farinaceous matter.

Officinal preparations.—*Extractum Colocynthidis*, L. D. *Extractum Colocynthidis comp.* L. D. *Pilulæ Colocynthidis comp.* E. D. *Pilulæ Aloes cum Colocynthide*, D.

CUMINUM. *Spec. Plant. Willd.* i. 1440.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 547. *Fruit* ovate, striated. *Partial umbels* four. *Involucre* four-cleft.

Sp. 1. C. *Cyminum.*[2] *Cumin. Med. Bot. 3d edit.* 143. *t.* 56.

Officinal. CYMINUM, *Lond.* Cumin seed.

Syn. Cumin (*F.*), Romischen Kumel (*G.*), Komyn (*Dutch*), Kummen (*Dan.*), Spis Kummen (*Swed.*), Semenza di Comino (*I.*), Semilla de Comino (*S.*), Kmin (*Polish*), Siragum (*Tam.*), Zereh (*Pers.*), Jantan (*Malay*), Kimoon (*Arab.*), Iirá (*H.*), Iiraca (*San.*), Jeera (*Beng.*).

This plant is an annual, a native of Egypt, but cultivated in great abundance in Sicily and Malta; whence the seeds are brought to this country. It flowers in June. It rises eight or ten inches in height, on a slender, round, often procumbent, branching stem. The leaves are of a deep green colour, narrow, linear, and pointed; the flowers purple, in numerous four-rayed umbels; with umbellets having seldom more than four flowers. Both the involucres and involucels consist of three or four subulate unequal leaflets. The corolla is composed of five unequal petals, inflected, and notched at the apex; the filaments support simple anthers; and the germen is inferior, large, ovate, with two minute styles terminated by simple stigmas. The fruit consists of two oblong, striated seeds, united by their flat sides, of a pale brown colour, bristly on their convex surface.

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[1] *Leçons faisant partie des Cours de Méd. Legale*, de M. Orfila.
[2] Κυμινον Dioscoridis.

Qualities.—Cumin seeds have a strong, peculiar, heavy odour, and a warm, bitterish, disagreeable taste. Water extracts little more than their odour; but alcohol takes up both odour and taste; and yields, when evaporated, an extract containing the sensible qualities of the seeds. In distillation with water, a large proportion of yellow, pungent, volatile oil comes over, which has the strong ungrateful odour of the seeds.

Medical properties and uses.—Cumin seeds are carminative and stomachic; but they are chiefly employed as an external stimulant in discussing indolent tumours.

CUPRUM. *Edin. Dub.* Copper.

Syn. Cuivre (*F.*), Kupfer (*G.*), Koper (*Belg.*), Kobber (*Dan.*), Koppar (*S.*), Rame (*I.*), Cobre (*Swed.*), Miedz (*Polish*), Mjed (*Russian*), Shemboo (*Tam.*), Tambaga (*Malay*), Nehass (*Arab.*), Tamba (*Duk.* & *H.*), Tamra (*San.*), Ka-nōō-yak (*Esquimaux*).

Copper is a metal of a yellowish or brownish red colour, found very abundantly in many countries in both hemispheres of the globe.[1] It is procured

A. In its metallic state:	
i. Crystallized, (*Alloy*) Sp.	1. *Native copper.*
ii. Sulphureted. ———	2. *Vitreous copper* (*common sulphuret*).
a. and combined with iron.	3. *Purple copper.*
———	4. *Grey copper.*
———	5. *Copper pyrites.*
———	6. *Black copper.*
b. ——— with iron and arsenic.	7. *White copper.*
B. United with oxygen:	
iii. Oxidized. ———	8. *Ruby copper.*
———	9. *Tile-red copper.*
———	10. *Black copper.*
c. and combined with carbonic acid. ———	11. *Azure copper, or Mountain blue.*
———	12. *Malachite.*
———	13. *Emerald copper.*
d. ——— with arsenic acid.	14. *Octahedral arseniate of copper.*
	15. *Hexahedral arseniate of copper.*
	16. *Prismatic arseniate of copper.*
	17. *Trihedral arseniate of copper.*
	18. *Martial arseniate of copper.*
e. and combined with phosphoric acid.	19. *Phosphate of copper.*
f. ——— with muriatic acid.	20. *Sandy copper.*[2]

[1] The richest copper mines are those of Cornwall in England, the Pyrenees, and of Fahlan in Sweden. [2] Vide *Aikin's Chymical Dictionary*, art. *Copper.*

The sulphurets are the most abundant ores, and those from which copper is usually extracted. In Britain these are procured chiefly in Cornwall.[1] The ore is first roasted to volatilize the sulphur, which escapes partly as sulphurous acid, partly as simple sulphur, which is collected in chambers connected by flues with the kilns. The metal is thus oxidized; it is reduced by smelting it, in contact with the fuel, in a large reverberatory furnace, with the addition of sand to separate the iron; which, being less fusible than the copper, remains in the scoria as an oxide, while the melted copper is drawn off through a plug-hole into earthen moulds. The copper, however, in this state, is still very impure; and therefore it is remelted and granulated; and lastly, refined by being again melted with the addition of a little charcoal, which brings it to a state fit to bear the hammer, and to answer the various purposes of art.

Pure copper has a yellowish red colour; is sonorous, ductile, malleable, tenacious; has a styptic, disagreeable taste, and emits an unpleasant odour when rubbed: its point of fusion is 1996 Fahr. The specific gravity, when it is pure, and has been only fused is 8·667. It has a granulated texture, and breaks with a hackly fracture; melts at a temperature equal to 27° of Wedgwood; is volatilized by a greater heat; and is oxidized, when heated in contact with atmospherical air, even at a temperature below that of ignition. It is capable of receiving a brilliant lustre by polishing. It remains unchanged in dry air; but when exposed to humidity and to air at the same time, it is tarnished, and a green crust is formed on its surface, which is a carbonate of the black oxide of copper.

Although copper in its metallic state was used as a remedy by the ancients, yet it is completely discarded from modern practice: and notwithstanding so much has been said of its deleterious effects, there is every reason for believing that clean copper, when taken into the stomach, exerts no action whatever on the system. Two cases of halfpence being swallowed by children have come under my observation, in one of which the copper coin remained six months in the intestines, and in the other two months. Both were evacuated without having in the smallest degree injured the health, although the impressions on the coins were nearly effaced, and the metal was much corroded. But poisoning from the use of copper utensils in cookery arises either from the formation of the green

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[1] The Parys mine in the Isle of Anglesea is now nearly exhausted. The Harz mines yield annually fifty tons of copper.

carbonate, mentioned above, owing to the vessels not being well cleaned, and the food being allowed to stand for some time in the pan exposed to the air, after it is taken from the fire; or from the formation of verdigris, when vinegar, used in making pickles, and other acid liquors intended for internal use, are boiled in brass or copper vessels. The salts of copper thus formed are poisons, exciting inflammation of the stomach; and many fatal accidents have arisen from the carelessness which produces them in cooking utensils, and from the equally dangerous mode of giving a fine green colour to vegetables by boiling halfpence with them; on which account copper utensils should be altogether banished from the kitchen and also from the laboratory, where they are sometimes employed in making decoctions. The salts of copper may be detected in any suspected liquor, by boiling first with dilute acetic acid and filtering: which separates the copper from all vegetable or animal matter. This solution is then to be treated by passing through it a stream of sulphureted hydrogen gas, collecting the precipitate, drying it, incinerating it in a glass tube, and converting the sulphuret into the sulphate by the addition of a few drops of nitric acid. The copper may be now rendered obvious, by diluting the solution of the sulphate, and placing it in a piece of clean polished iron wire, on which the copper is precipitated in a metallic state; or by dropping into the solution an excess of ammonia, which produces a beautiful blue colour, if any salt of copper be present: or by adding a drop or two of a solution of the ferrocyanate of potassa, which throws down a brown precipitate, and is one of the most delicate of the tests for the salts of copper. In cases of poisoning by any of the salts of copper, albumen is the best antidote.

The oxides of copper unite with acids, and form salts which act very powerfully on the animal system; but of these the *acetate* and the *sulphate* only are admitted into the list of Materia Medica.

1. ACETATE OF COPPER.

Officinal. DIACETAS CUPRI, *Lond.* ÆRUGO, *Dub.* SUBACETAS CUPRI, *Edin. Dub.* Verdigrise, or Subacetate of Copper.

Syn. Vert de gris (*F.*), Grunspan crystalle (*G.*), Verdegrise (*I.*), Cardenillo (*S.*), Vungala patchei (*Tam.*), Zungar (*Pers.* & *Duk.*), Sennang (*Malay*), Zunjar (*Arab.*), Pitrai (*H.*), Pitalata (*San.*).

This salt, which is an acetate, is principally manufactured in the south of France, at Montpellier, and Grenoble.[1] In the former place, the *marc* of the grape, that is, the cake

[1] Vide Chaptal's Account of the Manufacture, *Phil. Mag.* vol. iv. p. 71.

which remains in the wine-press after the juice is expressed, composed of the husks and stalks, is moistened with water, or with wine if poor, and disposed so as to excite in it the acetous fermentation. When this takes place it is spread in jars between well hammered plates of copper, about 1-24th of an inch in thickness, five inches long, and three broad: these are strongly heated over a pan of burning charcoal, and a layer of fermented marc placed between each plate of copper. The jars, each of which contains about 40lbs. of copper[1], besides marc, are then loosely stopped with straw, and left at rest for ten, fifteen, or twenty days; at the end of which time the marc begins to whiten and the copper is found to be covered with a green crust, interspersed with distinct silky green crystals. This is termed cottoning the copper. The plates are then moistened with water, and set up in racks, face to face, in a cellar: this is repeated once in seven days for six or eight times, until a thick coat of verdigrise is formed, which is scraped off; and the copper plates again subjected to the same process, until they are completely corroded. When the plates are first used, the verdigrise is apt to be black, unless their surfaces be previously rubbed with a solution of verdigrise, which is suffered to dry before they are used.

Verdigrise in this rough state is sold by the makers, who are generally women belonging to the wine farms about Montpellier, to commissioners, by whom it is further prepared. After being well beaten in wooden mortars, it is pressed down in bags of white leather, a foot in depth and ten inches wide, in which it is dried in the sun; and thus a loaf of verdigrise is formed, which cannot be pierced with a knife.

In this process the copper is oxidized, and the oxide combined with acetic acid, forming a diacetate, which is mixed with vegetable extractive matter and the stalks and husks of grapes. The Grenoble verdigrise is purer than the Montpellier, being prepared by simply disposing plates of copper in a proper situation, and repeatedly moistening them with distilled vinegar until the surface be oxidized, and changed into verdigrise.

The diacetate of copper is imported into this country in the leathern sacks, or bags, in which it is dried, each containing from fourteen to thirty pounds' weight. But it is also now prepared in Great Britain.

Qualities.—Good diacetate of copper is inodorous. It seems at first nearly insipid, although exceedingly styptic; but leaves

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[1] 40 lbs. of copper yield about five or six pounds of rough verdigrise.

a strong metallic taste in the mouth. The mass is dry, not deliquescent, of a hard, pulverulent, foliaceous texture, and a beautiful bluish green colour. Distilled water at 60° dissolves 0·56 parts, while 0·44 remain in the state of a fine green powder, long suspended in the solution: that part which is dissolved is an acetate of copper, consisting of 1 proportion of oxide of copper = 39·6 + 1 of acetic acid = 58·48, and 1 of water = 9, making the equivalent = 103·08, the filtered solution reddening litmus paper; whilst the insoluble powder is a diacetate, composed of 2 proportions of oxide = 79·2 + 1 of acid = 54·48 + 6 of water = 54, mixed with the impurities. When boiling water is used, the insoluble part is of a brown colour. Sulphureted hydrogen gas decomposes the solution, precipitating a black sulphuret of copper. A small cylinder of phosphorus put into the solution is rapidly covered with a coat of metallic copper.

Besides the stalks and husks of grapes, verdigrise is often adulterated with sand, and other earths. These are discovered by dissolving it in diluted sulphuric acid, which takes up the whole of the salt, and leaves the impurities; or by boiling it in twelve or thirteen times its weight of distilled vinegar, allowing the undissolved part to settle, and ascertaining its amount. The addition of muriate of baryta will detect any admixture of the sulphate or the tartrate of copper.

Medical properties and uses.—Verdigrise is tonic and emetic. It has been used in epilepsy; and extolled as an emetic in cases which require that the stomach should be quickly evacuated, without weakening it, as in incipient phthisis; but its internal exhibition is always dangerous, and to be avoided. It is, however, a useful detergent and escharotic application to foul ulcers, and the callous edges of sores; and to consume fungus; but it is seldom used, although it is milder than the sulphate. It is also employed as a collyrium in chronic ophthalmia.[1]

The dose of verdigrise to produce its tonic effect is under gr. ss.; that which is necessary to operate as an emetic, from gr. j. to grs. ij. In overdoses it quickly proves fatal, acting both locally and on the nervous system; the symptoms are colic pains, profuse vomiting and purging; sometimes salivation; convulsions, palsy, and fatal coma. On dissection, the coats of the stomach appear much thickened from inflammation; there is ulceration of the mucous membrane of the

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[1] Dr. Paris (*Pharmacologia*) says, that it is the active ingredient in *Smellome's Eye Salve,* a nostrum in much repute.

intestines, sometimes gangrene, and the whole is of a green colour. We formerly suggested the idea that fine filings of iron might precipitate the copper in its metallic state, and operate as an antidote, and that the experiments of Duval and others had proved that sugar is the antidote of cuprous poisons[1]; but our own experience since does not authorise an acquiescence in this account: and sugar reduces the salts of copper only by long ebullition. The best antidotes yet suggested are albumen and the ferrocyanate of potassa.

Officinal preparations.—*Cupri Subacetas præparata,* D. *Unguentum Subacetatis Cupri,* E. *Oxymel Cupri Subacetatis,* D.

2. ACETATE OF COPPER.

Officinal. CUPRI ACETATIS CRYSTALLI, *Dub.* Crystals of Acetate of Copper.

Syn. Verdet crystallisé, Cristaux de Vénus (*F.*), Destillirten Grunspan (*G.*).

This salt is manufactured both in France and Holland. It is easily obtained by dissolving 100 parts of verdigrise in 200 parts of distilled vinegar heated to boiling. When the solution is completed, it is poured off clear from any undissolved matter, and evaporated until ready for crystallization. The crystals are generally formed upon sticks, in conical masses. About three pounds of verdigrise are required to make one pound of crystals.

Qualities.—Crystallized acetate of copper has a deep green colour: the crystals are semi-translucent octahedrons, with a rhomboidal base. The taste is acrid. Exposed to the air, acetate of copper effloresces; and when heated is decomposed, giving off gaseous or anhydrous acetic acid, the metal reduced mixed with charcoal being left in the retort. It is soluble in 20 parts of cold water; in 5 of boiling water, and crystallizes on cooling; and in 14 of alcohol. Acetate of copper consists of 1 eq. of protoxide $=39{\cdot}6+1$ of acid $=51{\cdot}48+9$ of water $=81$, making the equivalent $=181{\cdot}08$, acid and water $61+$ oxide of copper 39, in 100 parts.

Medical properties and uses.—This salt possesses the same properties, and is used for the same purposes, as rough verdigrise.

3. SULPHATE OF COPPER.

Officinal. CUPRI SULPHAS, *Lond. Edin. Dub.* Sulphate of Copper.

Syn. Sulphate de cuivre (*F.*), Schwefelsaures Kupfer, Kupfervitriol (*G.*), Kopper vitriol (*Belg.*), Blaae vitriol (*Danish*), Vitriuolo di rame (*I.*), Caparosa (*S.*), Vitriolo de Cobre (*Portug.*), Zungbar (*Arab.*), Tuteya (*H.*), Tutt'ha (*San.*), Toorushoo (*Tam.*), Neelatota (*Duk.*), Palmanicum (*Cyng.*).

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[1] Vide *Traité des Poisons,* &c. par P. M. Orfila, tome ii. p. 289.

A considerable part of this salt, which is the blue vitriol of commerce, is obtained by evaporation from the water of some copper mines. Its origin is derived from the natural sulphurets of copper, which, suffering a chymical change from exposure to a moist atmosphere, are converted into the sulphate, and washed down by the rain and other water of the mines.[1] It is also obtained by roasting copper pyrites, and exposing it to the action of air and moisture; in which case, as well as in the former, the compound is oxidized by attracting the oxygen of the surrounding atmosphere, at the same time that it changes the sulphur into sulphuric acid: so that by the gradual combination of these the sulphate is produced, and is then extracted by solution, and crystallized. It is also, in France, made by sprinkling wet sheets of copper with sulphur, then heating them to redness, and plunging them in water. The surfaces of the sheets are thus covered with the sulphuret, which on exposure to the air gradually passes into the sulphate, which is dissolved and crystallized.

Qualities.—Sulphate of copper is inodorous, and has a very harsh, acrid, styptic taste. It always reddens vegetable blues. It is in semitransparent crystals, which undergo a slight degree of efflorescence when exposed to the air: their form is that of a rhomboidal prism; and their colour a deep rich blue. Its specific gravity is 2·1943.

Sulphate of copper is soluble in four parts of water at 60°, and less than two at 212°. It is insoluble in alcohol. The solution reddens litmus paper. It consists of 1 eq. of protoxide of copper $= 39{\cdot}6 + 1$ of sulphuric acid $= 40{\cdot}1 : = 79{\cdot}7$. It is decomposed by the alkalies and alkaline carbonates, the biborate and phosphate of soda, acetate of ammonia, the acetate and sub-acetate of lead, and acetate of iron, nitrate of silver, bichloride of mercury, tartrate of potassa, muriate of lime; and is precipitated by all the astringent vegetable infusions and tinctures; all which substances are therefore incompatible in prescriptions with this salt.

Medical properties and uses.—Sulphate of copper is emetic, astringent, and tonic, when taken internally. With a view to its emetic effect, it has been given in the early stage of phthisis, in croup[2], and where laudanum has been taken as a poison; and as an astringent and tonic, in chronic diarrhœa, alvine hæmorrhages, intermittent fever, epilepsy, and some other spasmodic affections: but as the list of Materia Medica

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[1] From this water at the Parys mine, a large supply of copper is obtained, by decomposing the sulphate, by throwing into the water old iron hoops.

[2] Drs. Serle and Malin used it with success. Vide *Hufeland's Journ.* Jan. 1834.

contains equally powerful and less hazardous remedies, its internal exhibition ought to be altogether discontinued. Externally it may be employed to give a healthy stimulus to indolent foul ulcers, in which I have found it extremely beneficial; and as an escharotic, to consume fungus. Pledgets dipped in a weak solution of it are also sometimes used as a styptic in epistaxis, and other external hæmorrhages; and a still weaker solution is a useful collyrium in some kinds of ophthalmia. It forms the basis of a very unchymical preparation, Bate's *aqua camphorata*[1], which the late Mr. Ware recommended, diluted with sixteen parts of water, in the purulent ophthalmia of infants.

As an emetic, the dose is from grs. ij. to xv., in f ℥ ij. of water; but as a tonic it should be given in the form of pill, beginning with gr. $\frac{1}{6}$, and gradually increasing the dose to grs. ij.

Officinal preparations.—*Solutio Cupri Sulphatis composita*, E. *Cupri Ammonio Sulphas*, L. *Cuprum Ammoniatum*, E. D.

CURCUMA. *Roscoe, Linn. Trans.* vii. 354.

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Scitamineæ.

Gen. Char. *Anther* double, two-spurred. *Filament* petal-like, three-lobed, bearing the anther in the middle.

Sp. 1. C. *longa.*[2] *Spec. Plant. Willd.* 1. 7.

Officinal. CURCUMA LONGA RADIX, *Dub.* Turmeric.

Syn. Zedoire, Saffran des Indes (*F.*), Zedoar, Gelb wurzel (*G.*), Zedoaria (*I.*), Judwar (*Arab.*), Nirbisi (*San.*), Banhaldi (*Beng.*), Keang whang (*Chinese*), Huldic (*Hindoo*).

This plant is a perennial, a native of the East Indies, growing in sandy open places in Ceylon and Malabar, where it is named *Acua* by the Brahmins; and flowering in April and May. The root is tuberous, oblong, whitish, and about the thickness of a finger, and studded with nodes, the relics of fleshy fibres: the leaves are palmated, broad, lanceolate, subsessile on their sheath; seriaceous underneath; colour an uniform green.[3] The scape, which rises from among the leaves, is naked, and terminated by a lax, cylindrical, truncated, lateral spike of flowers.

The best tubers come from Ceylon, in firm, short, wrinkled pieces, of an ash-colour externally, and internally of a deep orange yellow. They should be heavy, and not worm-eaten.

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[1] The following is the formula for Bate's preparation: — ℞ *Cupri sulph.* *Boli gall.* *aa* grs. xv. *Camphoræ*, grs. iv. *Solve in aq. ferv.* f ℥ iv., *dilueque cum aq. frig.* O iv. *ut fiat Collyrium.*

[2] The excellent reasons given by Mr. Roscoe for separating this plant from the genus *Amomum*, induce me to prefer his authority to that of Willdenow in this instance.

[3] Roxburgh; vide *Asiatic Researches*, vol. xi. p. 165.

Qualities.—The odour of curcuma is fragrant, and somewhat like that of camphor; the taste biting, aromatic, and bitterish, with some degree of acrimony. The tubers break with a short close fracture, are pulverulent, and internally of a brownish red colour. The active principles are partially extracted by water, and more completely by alcohol, ether, and oil. In distillation with water, a heavy, greenish essential oil is obtained, which deposits camphor. According to the analysis of John, curcuma yields volatile oil 1 part, yellow resin 11 parts, yellow extractive 12, gum 14, ligneous fibre, mixed with a substance insoluble in alcohol but soluble in potassa, 57, and water 6, in 100 parts. It seems to contain, independent of its aromatic and bitter principles, a large proportion of fecula, in conjunction with the ligneous fibre. From the action of the alkalies on this colouring principle, turning it to red-brown, curcuma is the best test of the presence of these bodies.

Medical properties and uses.—Curcuma is tonic and carminative. It was much employed by Avicenna, and other Arabians, in vomitings, colics, lientery, difficult menstruation, and as an antidote for venomous bites. It is certainly an agreeable stomachic, and useful in flatulent colic; but it is scarcely ever used by modern practitioners. The dose of the powdered tuber may be from grs. viij. to ʒ ss., two or three times a day.

CUSPARIA. Vide *Galipea Cusparia.*

CYDONIA. *Spec. Plant. Willd.* ii. 1012.

Cl. 12. *Ord.* 1. Icosandria Pentagynia. *Nat. ord.* Pomaceæ.

G. 992. *Calyx* five-cleft. *Petals* five. *Pome* inferior, five-celled, many-seeded.

Species 17. C. *vulgaris.* The Quince tree. *Med. Bot. 3d edit.* 505. *t.* 182.

Officinal. CYDONIÆ SEMINA, *Lond.* Quince seeds.

Syn. Semen de Coignassier (*F.*), Quittenkörne (*G.*), Kwee (*Dutch*), Quaede (*Dan.*), Quitten (*Swed.*), Pigwa (*Pol.*), Semi de Cotogno (*I.*), Simiente de Membrille (*S.*), Marmelo (*Port.*), Hubalsufirjul (*Arab.*), Beheckey beej (*H.*), Béhdānā (*Tam.*), Bedana (*Pers.*).

The quince tree was originally brought from Cydon[1] in Crete by the Greeks; but it has been found growing wild in Germany and on the rocky shores of the Danube, and is cultivated to great perfection in England, and many other parts of Europe; flowering in May. It is a low, crooked tree, with many spreading branches, and covered with a brown

[1] Whence its Greek name μηλεα Κυδωνια (Theophrasti) is derived. It is supposed to be the apple of the Hesperides.

bark. The leaves are ovate, very entire, about 2½ inches long, and 1½ inch broad, of a dusky green colour on the upper surface, paler and downy beneath: the flowers are large and solitary: the calyx, which is of the length of the corolla, is spreading, serrated, persistent, and villous: the petals rose-coloured or white, concave, roundish, and inserted into the calyx: the filaments are awl-shaped, purplish, and support yellow anthers: the fruit is, according to Gærtner, a berry.[1] Its magnitude and shape are those of a moderate-sized pear.[2] It is of a yellow colour, downy, umbilicated; and when ripe, has a pleasant odour, and a very austere, acidulous taste[3]: each of its cells contains from eight to fourteen ovate, angled, reddish brown, coriaceous seeds, placed erect in pairs.

Qualities.—The seeds are inodorous, and nearly insipid, having a slight bitterness only when long chewed. The inner coat contains a considerable quantity of mucus, which can be extracted by hot water; but it is not pure mucus, being mixed with fecula and other soluble parts of the seeds, and also malic acid.

Officinal preparation.—*Decoctum Cydoniæ*, L.

CYTISUS.[4] *Spec. Plant. Willd.* iii. 926.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.

G. 1332. *Stigma* longitudinal, villous above. *Filaments* adhering to the germen. *Calyx* produced downwards.

* * *With ternate leaves.*

Species. C. *Scoparius.* Common Broom. *Med. Bot. 3d edit.* 413. t. 150. *Smith, Flora Brit.* iii. 753. *De Candolle.*

Officinal. SCOPARIUS, *Lond.* SPARTII SCOPARII SUMMITATES, *Edin.* CACUMINA, *Dub.* The tops and seed of Broom.

Syn. Genet à balais (*F.*), Pfriemenkraut (*G.*), Bezembren (*Dutch*), Gyfvel (*Dan.*), Pingsblomma (*Swed.*), Ginestra (*I.*), Esparto (*S.*), Giesta (*Port.*).

This is an indigenous shrub, growing on dry common pastures; flowering in May and June. It usually rises from four to six feet in height, and sends off numerous, straight, angled, green, smooth, leafy branches: the leaves are ternate, small, and smooth; the upper ones, however, are frequently simple. The flowers are papilionaceous, axillary, solitary, peduncled, nodding, large, and showy; of a golden colour; sometimes tawny on the outside, and occasionally altogether of a lemon

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[1] *De Fructibus*, ii. 45. *t.* 87.

[2] The quince tree varies in the form of its fruit, which is sometimes globular, sometimes oblong, but more generally pyriform; and, also, in the magnitude of its leaves.

[3] Although the fruit of the quince is not good in its raw state, yet it affords an elegant sweetmeat, called quince marmalade, *mira cydonarium*; and from the expressed juice an excellent and wholesome wine is prepared.

[4] Σπαρτιον Dioscoridis.

hue: the calyx is nearly bell-shaped, bilabiate, gaping, even, and purplish, with a five-toothed lip: the stamens are all united into a tube at the base, and bear oblong saffron-coloured anthers: the germen is villous: the style bent almost to a circle: and the legume compressed, brown, ciliated, and containing several compressed shining seeds.

Qualities.—The tops, when bruised, have a disagreeable odour, and a nauseous bitter taste. Both water and alcohol extract their active matter.

Medical properties and uses.—Broom-tops are diuretic and cathartic: the seeds are said to be emetic. The effects of this plant have been very long known to the common people; and both Mead and Cullen found them useful in dropsy. The usual mode of exhibiting them is in the form of decoction, made by boiling ℥j. of the green tops in a pint of water down to half a pint. Speaking of this decoction, of which two table-spoonsful were given every hour till it operated by stool, Cullen says[1], "It seldom fails to operate both by stool and urine; and by repeated exhibition, every day, or every second day, some dropsies have been cured[2]:" Sydenham used the ashes, which contain an alkaline salt.[3]

Officinal preparation.—*Extractum Cacuminum Genestæ*, D.

DAPHNE.[4] *Spec. Plant. Willd.* ii. 415.

Cl. 8. *Ord.* 1. Octandria Monogynia. *Nat. ord.* Thymelaceæ.

G. 773. *Cal.* none. *Cor.* four-cleft, corollaceous, withering, enclosing the stamens. *Drupe* one-seeded.

* *Flowers lateral.*

Species 1. D. *Mezereum.* Common Mezereon. *Med. Bot.* iv. 716. *t.* 68. *Smith, Flor. Brit.* 420.

Officinal. MEZEREUM, *Lond.* DAPHNES MEZEREI CORTEX, *Edin. Dub.* The bark of the root.

Syn. Laureole gentile, Garou (*F.*), Kellerkals (*G.*), Pepperbompje (*Dutch*), Kielderhals (*Dan.*), Tibast (*Swed.*), Wyleze lyko (*Pol.*), Mezereo (*I.*), Mezereou (*S.*), Mezereo (*Port.*).

Mezereon grows wild in England, and the north of Europe; but for medical use, and as an ornamental shrub, it is cultivated in gardens. Its flowers expand in March, before the leaves. It is a hardy plant, seldom exceeding four feet in height, with a strong woody branching stem, covered with a smooth grey cuticle, and a tough fibrous inner bark. The root is of a fibrous texture, pale-coloured, with a smooth olive-coloured bark: the leaves which are protruded from the extremities of the branches are tender, pale green, deciduous,

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1 *Mat. Med.* ii. 534.

2 *Ibid.*

3 *Tract. de Hydrope*, Opera, 466.

4 Δαφνη Theophrasti et Dioscoridis.

lanceolate, sessile, entire, and smooth: the flowers are of a pale rose-colour, odorous, surrounding the twigs in clusters below where the leaves are sent off; they are sessile, two, three, and four clustered, with deciduous bractes at the base of each cluster; monopetalous, tubular, and the lip divided into four ovate spreading segments; the stamens are alternately shorter; the four higher ones displaying their yellow anthers at the mouth of the tube: the germen is oval, supporting a flattish stigma on a very short style; and the fruit is a red pulpy drupe, containing one round seed. There is a variety of the mezereon with white flowers and yellow fruit, but the medicinal effects of both are the same.[1]

For medical use, the roots are dug up in the autumn, after the leaves have fallen. The cuticle of the dried root is corrugated, and the inner bark has a white cotton-like appearance. It is imported chiefly from Germany.

Qualities.—The inner bark of every part of this plant, when fresh, is tough, pliable, fibrous, and striated: it is very acrid, capable of producing inflammation, vesication, and a discharge of serum when applied to the skin; and when chewed, excites a considerable heat of the mouth and fauces, which continues for many hours afterwards. The fruit is equally acrid, acting as a corrosive poison, if eaten. The bark retains its acrimony when dried. It yields its virtues to water and vinegar. By digesting the bark in alcohol, then evaporating the liquid to separate the resin, and diluting the residual fluid with water, filtering, and adding acetate of lead, a copious yellow precipitate falls, which, when freed from the lead by means of sulphureted hydrogen gas, is found to be a vegetable principle *sui generis;* to which the name of *Daphnina* has been given.[2] This salt is procured in prisms united in bundles, transparent and shining; it dissolves readily in hot water, and crystallizes again as the solution cools; it is also soluble in alcohol and ether. Nitric acid converts it into oxalic acid. Gmelin and Bar have separated from Mezereon an acrid resin of a dark green colour, slightly soluble in water, and possessing a vesicating property.

Medical properties and uses.—Mezereon operates as a stimulating diaphoretic, increasing the general arterial action, and determining powerfully to the surface; but it is apt to

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[1] In France, Daphne *Guiolium,* and in Germany, D. *Laureola,* are used indiscriminately with D. *Mezereum.*

[2] Vauquelin first obtained this from D. *Alpina.* *Ann. de Chim.* lxxxiv. p. 174.

disorder the primæ viæ, and occasion vomiting and purging. It was long externally employed as a stimulus to ill-conditioned ulcers; and the recent bark, macerated in vinegar and applied to the skin, is recommended in France for producing and keeping up a serous discharge in chronic local affections. To form the issue, the bark must be renewed every night and morning; and afterwards once in twenty-four hours, to keep open the drain. Dr. Withering employed it successfully as a local stimulant in a case of difficulty of swallowing occasioned by paralysis. Although the case was of three years' standing, the patient recovered the power of swallowing in about a month, by very frequently chewing thin slices of the root. For this purpose it should be sliced longitudinally, as the acrimony resides in the bark only, the woody fibre being nearly inert. Internally, a decoction of this bark has been used against chronic rheumatism, scrofulous swellings, lepra, and some other cutaneous diseases; and, till lately, it was considered an antivenereal remedy of great efficacy, when given in conjunction with sarsaparilla, in the Lisbon diet drink. The dose in substance is gr. j. to grs. x. It is scarcely ever prescribed in this form.

Officinal preparations.—*Decoctum Daphnes Mezerei*, E. *Decoctum Sarsaparillæ comp.* L.

DATURA. *Spec. Plant. Willd.* i. 1007.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.

G. 337. *Corolla* funnel-shaped, plaited. *Calyx* tubular, angled; deciduous. *Capsule* with four valves.

Species 2. D. *Stramonium.* Thorn apple. *Med. Bot. 3d edit.* 197. *t.* 74. *Smith, Flor. Brit.* 253. *Biglow, Amer. Med. Bot.* i. 17.

Officinal. STRAMONII FOLIA ET SEMINA, *Lond.* DATURÆ STRAMONII HERBA, *Edin.* STRAMONIUM; HERBA, SEMINA, *Dub.* The herbaceous part of the Thorn-apple plant.

Syn. Pomme Epineuse (*F.*), Gemeine Stechapfel (*G.*), Dornappel (*Dutch*), Piigaeble (*Dan.*), Spikklubba (*Swed.*), Jondera (*Pol.*), Stramonio (*I.*), Estramonio (*S.* & *Port.*), Karoo Oomatie (*Tam.*), Dhétoora (*H.*), Jeuz massel (*Arab.*), Goozgneah (*Pers.*), Rotecubung (*Malay*), Kala D'hatoora (*Beng.*), Kaloo Attana (*Cyng.*), Krishna Dhaturra (*Sans.*).[1]

This annual plant is a native of America, but is now naturalized to this country, and found growing on dunghills and by road-sides[2], from the fruit ejected from gardens; flowering in July and August. It rises about two feet in height, with a round stem, branching and dichotomous above; spreading and leafy. The leaves, which spring from the forks of the

[1] These oriental synonymes, although inserted under this species, yet are those of D. *fastuosa.*

[2] Very common about London.

stem on long round petioles, are large, of a dark green colour on the upper surface, and pale beneath; irregularly ovate-triangular in figure, sinuated, and unequal at the base: the flowers are large, axillary, and solitary, on short erect peduncles: the calyx is about two inches in length, tubular, pentangular, and five-toothed: the corolla longer, of a white colour, funnel-shaped, and plaited: with the filaments, which support oblong flat anthers, adhering to the tube; and the style filiform, terminated with a thick club-shaped stigma. When the corolla and its included parts drop, the calyx also separates, except the base, which remains, and, becoming reflex, enlarges with the receptacle as a support to the fruit. The fruit is a large, fleshy, ovate-roundish, four-cornered capsule, beset with sharp awl-shaped spines, four-celled at the base, two-celled at the apex, and containing a great number of reniform compressed seeds. The leaves, capsule, and seeds, are medicinally used.[1]

Qualities.—The whole herb has a narcotic fœtid odour, producing headach; a bitterish nauseous taste, and gives to the saliva a deep green tinge when chewed. The analysis of Promnitz gives, as the components of thorn-apple, gummy extractive 58, extractive 6, chlorophylle 64, albumen 15, resin 12, and phosphate of lime and magnesia 23 : = 178 parts. According to Wedenberg[2], it contains gum (*mucus?*) and resin, a volatile matter (which I find to be carbonate of ammonia), and a narcotic principle, which has lately been ascertained by M. Brandes to be an alkaline salt. He obtained it from the seeds, in which it is combined with malic acid, and named it *Daturia.* It is nearly insoluble in water and in cold alcohol, but boiling alcohol dissolves it, and, on cooling, lets it fall in flocculi. It is crystallized with difficulty, but has been obtained in quadrangular acicular crystals. It forms neutral salts with the acids[3], which are highly poisonous: yet Berzelius says this salifiable base is merely phosphate of ammonia.[4] Daturia is procured by boiling the seeds in alcohol, treating the tincture with magnesia, which combines with the malic acid, and throws down the daturia with excess of magnesia. By treating the precipitate with alcohol, the daturia is taken up, and crystallizes as the solution cools. The medicinal virtues of the herb are extracted both by water and alcohol.

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1 According to Dr. W. Ainslie, this species of Datura is not found in India; but the D. *fastuosa,* Dhétoora (*Hind.*), Dhaturra (*Sans.*), Kkassian (*Jav.*), is well known and medicinally used.—*Mat. Med. of Hindostan,* 4to. p. 42.

2 *Dissertatio Medica de Stramonii Usu,* &c. Upsal, 4to.

3 *Journ. de Physique,* xci. p. 144.

4 *Traité de Chimie,* t. iv. 319.

The watery infusion is transparent, with a very pale yellow hue, which is dissipated by acids, but very much deepened by the alkalies. It throws down whitish precipitates with acetate and superacetate of lead, and a black precipitate with nitrate of silver. Solution of sulphate of iron strikes a deep olive colour, and bichloride of mercury renders it milky; but neither is precipitated till after a very considerable time.

Medical properties and uses.—Thorn-apple is narcotic and stimulant. Baron Stoerck first recommended it as an internal remedy in cases of mania and epilepsy; but as Cullen remarks, he was less violent in his commendations of it than of the other narcotic plants which he introduced.[1] It was afterwards tried by other continental physicians with unequal success; particulary by Greding, who made the greatest number of trials of it. But the most decided experiments in its favour have been made by Dr. Barton, of America, who regards it as a remedy of great efficacy. He found that, when the dose of the dried herb was gradually increased to thirty grains, it dilated the pupil, and produced paralysis of the eyelids; effects which were removed by a blister. Cataplasms of the bruised fresh leaves have been successfully used as an application to inflammatory tumours, and for discussing masses of indurated milk in the breasts of nurses; and an ointment made with the powdered leaves allays the pain of hæmorrhoids. Smoking the plant in the manner of tobacco affords relief in the paroxysms of spasmodic asthma; a practice introduced into England from Ceylon. The inspissated, expressed juice of the leaves has been usually given; and the extract has been lately found almost specific in severe chronic pains. The seeds are more powerful than the herb. The root is given by the native practitioners in the Carnatic, in violent headaches. Hufeland recommends the form of tincture. The dose of the powdered plant is grs. x. to ℈j.; that of the extract, at first, should not exceed gr. ss. twice a day, increasing the quantity gradually, until grs. xij. be taken in twenty-four hours.

Several instances of the fatal effects of stramonium, when eaten by mistake, are recorded by authors.[2] It produces at first intoxication, with intense redness of the face, then high delirium, stupor, convulsions, furious madness, paralysis, cold sweats, and death. In some cases, the skin of the face, neck,

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[1] *Materia Medica*, ii. p. 281.

[2] It is said to be sometimes used by the Turks instead of opium, or as a substitute for wine; and the Chinese infuse the seeds in beer.—*Spratt's Hist. of the Roy. Soc.* 162.

and breast, were covered with brilliant stellated petechiæ. When death does not ensue, the attack terminates with a troublesome itching, which slowly subsides. As these effects depend on the narcotic principle and determination of blood to the head, bleeding is indicated: no antidote is known: but the free use of vinegar, after the stomach has been emptied, has been found useful.

DAUCUS. *Spec. Plant. Willd.* i. 1389.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 53. *Cor.* somewhat rayed. *Flor. of the disk* abortive. *Fruit* hispid with hair.

Species 1. D. *Carota.*[1] Common Carrot. *Med. Bot. 3d edit.* 130. *t.* 50. *Smith, Flor. Brit.* 300.

Officinal. DAUCI FRUCTUS, RADIX, *Lond.* DAUCI CAROTÆ RADIX, *Edin. Dub.* DAUCUS SYLVESTRIS; SEMINA, *Dub.* The root of the cultivated Carrot, and the seed of wild Carrot.

Syn. Carotte (*F.*), Karotte, Mohrrübe (*G.*), Karoot (*Dutch*), Derreurt (*Dan.*), Morot (*Swed.*), Marchew (*Pol.*), Carota (*I.*), Zanahoria (*S.*), Cenoira (*Port.*), Jezer (*Arab.*), Gajer (*H.*), Garjara (*San.*), Carrot halung (*Tam.*), Zerdek (*Pers.*).

The carrot is a biennial indigenous plant. In its wild state it is found abundantly in pastures and on hills[2]; flowering in June and July. It is cultivated for culinary purposes and feeding cattle. The root is spindle-shaped, fleshy, and of a yellow colour; throwing up a round furrowed stem, which rises about two feet in height, and sends off long, erect, naked, floriferous branches: the leaves are large, petiolated, thrice-pinnate, cleft, and hairy: the flowers are in many-rayed compound umbels, flat on the top, and spreading, but after the flowering season they become condensed in a concave form: the involucre consists of several narrow trifid leaves; the involucel is more commonly simple: the marginal flowers are white or yellow; the central, which are abortive, often of a dark blood colour: the seeds are in pairs, egg-shaped, convex, rough, and bristled on one side and flat on the other. These appearances are changed by cultivation, which also increases the size and the nutritious matter of the root.[3]

Qualities.—The sensible qualities of the *root* of the *cultivated carrot* are well known. It contains chiefly mucilage and sugar. The *seeds* of the *wild* variety have an aromatic odour, and a warm pungent taste; qualities depending on

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[1] Σταφυλινος ἀγριος Dioscoridis.

[2] We have seen it in great abundance on the range of chalk hills which overlook Ryegate in Surrey.

[3] Carrots are seldom sufficiently boiled: but when well boiled, they are very digestible and nutritious.

a volatile oil, which may be separated by distillation with water.

Medical properties and uses.—The root of the garden carrot is emollient and antiseptic, and is successfully used, when boiled and beaten to a pulp, as a poultice to correct the discharge of fœtid and ill-conditioned sores, and to allay the pain of carcinomatous and phagedenic ulcers. The seeds are carminative and diuretic, and hence useful in flatulent cases: but they possess no efficacy in gravel, for which they have been extolled.[1]

The dose of the bruised seed is from ℈ j. to ʒ j. or more.

Officinal preparation.—*Cataplasma Dauci*, D.

DELPHINIUM. *Spec. Plant. Willd.* ii. 1226.

Cl. 13. *Ord.* 3. Polyandria Tryginia. *Nat. ord.* Ranunculaceæ.

G. 1061. *Cal.* none. *Pet.* five. *Nect.* bifid, horned behind. *Pods* three or one.

* * *Three capsuled.*

Species 13. D. *Staphisagria.*[2] Staves-acre. *Med. Bot. 3d edit.* 471. *t.* 168.

Officinal. STAPHISAGRIA, *Lond.* DELPHINII STAPHISAGRIÆ SEMINA, *Edin. Dub.* Staves-acre seeds.

Syn. Staphisagre (*F.*), Stephanskraut laus-körner (*G.*), Luiskruid (*Dutch*), Lunsurt (*Dan.*), Staffans frö (*Swed.*), Gnidosz ziele (*Polish*), Stafisagria (*I.*), Piojera (*S.*), Alvarraz (*Portug.*).

This species of larkspur is a biennial plant, a native of the south of Europe, flowering from June to August. It is a handsome plant, from one to two feet in height, with a downy, erect, purplish, simple stem, and palmated leaves, the lobes of which are five or seven in number, of a pale green colour, oblong, ovate, and sometimes acutely indented. The flowers are of a blue or purplish colour, in an open terminal spike, and supported on long flower-stalks; the uppermost petal projected backwards so as to form a hollow spur, which encloses two spurs of the superior leaflets of the nectary. The filaments are about twenty, and short, bearing large yellow anthers: the germens three, close together, tapering, downy, and crowned with short filiform styles, having simple stigmas. The seeds are rough, brown, triangular, and contained in straight oblong capsules. They are usually imported from Italy; for although the plant is occasionally raised in our gardens[3], yet it is difficult to preserve it through the winter so as to enable it to perfect its seed.

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[1] The red central flowers of the umbels have been extolled in epilepsy.

[2] Σταφις ἀγρια Dioscoridis.

[3] It was first cultivated in England by Gerard in 1596.

Qualities.—Staves-acre seeds have very little odour, but that little is disagreeable: their taste is bitter, acrid, and hot. They are yellowish within, and covered with a rough blackish cuticle. Their virtues are partially extracted by water, and completely by alcohol. MM. Lassaigne and Feneulle discovered that their active properties depend on a peculiar alkaline principle, which they named *Delphine* or *Delphia.* It is found in the plant in the state of an oxalate. It is a white crystalline powder, inodorous, acrid and bitter to the taste. When heated it melts like wax, and again hardens on cooling; and in a high temperature burns, leaving a little charcoal. It is scarcely soluble in cold water, but very soluble in alcohol. It unites with acids forming neutral salts: its acetate is a virulent poison. Delphia, in a separate state, exerts violent poisonous properties, in very small doses; acting chiefly on the nervous system. To procure it, boil the powdered seeds in distilled water, and press through a cloth. Filter the decoction, and boil it for a few minutes with pure magnesia: re-filter and boil the residuum left on the filter with alcohol; and, lastly, cautiously evaporate the solution. A white powder is obtained, which is *Delphia.* It consists of 76·60 parts of carbon + 8·89 of hydrogen + 5·93 nitrogen + 7·49 oxygen = 100·00.

Medical properties and uses.—These seeds are emetic and cathartic, but their operation is so violent that they are never internally administered. Owing to their stimulating powerfully the salivary gland, when chewed, they have been used as a masticatory in toothach; but they are chiefly employed in powder, mixed with hair-powder, for destroying pediculi of the head.

DIANTHUS.[1] *Spec. Plant. Willd.* ii. 671.

Cl. 10. *Ord.* 2. Decandria Digynia. *Nat. ord.* Caryophylleæ.

G. 893. *Calyx* cylindrical, one-leafed, with four scales at the base, *Petals* five, with claws. *Capsule* cylindrical, one-celled.

* * *Flowers solitary, many on the same stem.*

Species 9. D. *Caryophyllus.* Clove-pink, or Gillyflower. *Med. Bot. 2d edit.* 579. *t.* 205. *Smith, Flor. Brit.* 461. *Eng. Bot.* 214.

Officinal. DIANTHI CARYOPHYLLI FLORES, *Edin. Dub.* Flowers of the Clove-pink.

Syn. Giroflée musquée (*F.*), Gewürzhaft riechende Gartennelke (*G.*), Garofano (*I.*), Clavel (*S.*).

This is a perennial plant, a native of Italy, but found growing wild on ruined walls, as those of Rochester, Deal, and

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[1] From Διος ανθος, the flower of Jove; yet it was unknown to the ancients.

other old castles in England; flowering in July.[1] It is cultivated in gardens for medicinal use; in which case the flowers become full, and improve their native odour. The root is firm and fibrous. The stems, which rise from among tufts of channelled, linear, glaucous leaves, that are finely toothed a little above the base, but entire and smooth towards the apex, are erect, branched, and panicled, bearing solitary flowers. The whole herb is glaucous. The calyx is striated, tubular, five-cleft, of a pale green colour, with four rhomboid, pointed scales at its base, about one fourth of its length: the petals vary in colour from a pale flesh-red to the deepest carnation; are unequally crenated, smooth at the orifice, with long, narrow, whitish claws. The stamens are often short and abortive; the styles long, recurved, and downy on the upper side.

The varieties of this species of dianthus produced by horticulturists are very numerous. For medicinal use, those should be chosen which have the richest colour and most spicy odour. The petals must be picked when the flower is fully blown.

Qualities.—The odour of the petals is fragrant and aromatic, resembling that of the clove-spice, the taste slightly bitter and subastringent. Both water and alcohol extract their sensible qualities; and they yield an essential oil by distillation with water. The infusion strikes a black colour with sulphate of iron: acids redden its colour, and alkalies change it to green.

Medical properties and uses.—Notwithstanding the testimony of our forefathers in favour of the efficacy of these flowers in nervous affections[2], modern practitioners value them merely for their sensible qualities, and employ them only to give an agreeable flavour and fine colour to a syrup, which is a pleasant vehicle for the exhibition of more active medicines.

DIGITALIS. *Spec. Plant. Willd.* iii. 283.

Cl. 14. *Ord.* 2. Didynamia Angiospermia. *Nat. ord.* Scrophularineæ.

G. 1155. *Cal.* five-parted. *Corolla* bell-shaped, five-cleft, bellying. *Capsule* ovate, two-celled.

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[1] Ray and Hudson suppose it to be an outcast of gardens, and not an indigenous plant of England. It is mentioned by Chaucer under the name "cloue gilofre;"

——————— "to put in ale,
Whether it be moist or stale."

[2] Gerard says, that when they are made into a conserve, they are "exceeding cordiall, and wonderfully above measure comfort the heart."

Species 1. D. *Purpurea.* Purple Foxglove.[1] *Med. Bot. 2d edit.* 218. *t.* 78. *Smith, Flor. Brit.* 665. *Eng. Bot.* 1297. *Withering's Account of Foxglove.*

Officinal. DIGITALIS FOLIA, SEMINA, *Lond.* DIGITALIS PURPUREÆ FOLIA, *Edin. Dub.* Foxglove leaves and seeds.

Syn. Grande Digitalis (*F.*), Purpurrother Fingerhut (*G.*), Paarsch vingerhoed (*Dutch*), Fingerbölle (*Dan.*), Fingerborrsort (*Swed.*), Paluszniczek (*Pol.*), Digitale Porporino (*I.*), Dedalera purpurea (*S.*), Deda leira (*Portug.*).

Foxglove is an indigenous biennial plant, found growing generally on the sides of hills and roads, where the soil is dry, sandy, or gravelly; flowering from the middle of June to nearly the middle of August. The root is knotty and fibrous, sending up an erect stem about four feet in height; round, downy, and leafy. The lower leaves are in tufts, large, about eight inches in length and three in breadth, ovate, and pointed, with bordered fleshy peduncles: the upper or stem leaves are alternate, sparse, and lanceolate; and both kinds have bluntly serrated, nearly crenate edges, and wrinkled velvety surfaces; with the upper surface of a beautiful deep green colour, and the under paler and more downy. The flowers, which are numerous, are attached on foot-stalks to one side of the upper part of the stem, so as to allow them to hang down and form a very elegant terminal spike. At the base of each foot-stalk is a sessile, pointed florid leaf. The uppermost segment of the calyx is narrower than the other four: the corolla is monopetalous, of an oblong bell-shape, and about the size of the little finger of an ordinary glove, bellying on the lower side, with a short, tubular base; the upper lip is slightly cloven, and more reflected than the under, which is larger: the corolla is guarded by long hairs at the mouth: its general colour is a bright pinkish purple, with the tube white, and the bellying part sprinkled on the inside with dark purple spots on a white ground, which give to the outside a speckled appearance: the filaments are white, curved, bearing large oval yellow anthers: the germen is pointed, supporting a simple style with the apex cloven: the seed-vessel, which is a pyramidal capsule, with a double partition produced by the inflected margins of the valves[2], contains many small, ferruginous, punctated seeds.

The leaves are the parts of the plant medicinally used. They should be gathered when the plant is in flower, and

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[1] It was named *Digitalis* by Fuchsius, (*Plantarum omnium Nomenclaturæ*, 1541,) the first author who notices its medicinal properties, from the German name Fingerhut, a finger-stole. It had been previously described by Tragus under the name of Campanula *sylvestris.*

[2] *Gærtner de Fructibus,* &c. i. 247. t. 53. f. 6.

those only which are fresh selected. "The leaf-stalks and midrib should be rejected, and the remaining part be dried either in the sunshine, or on a tin pan or pewter dish before the fire, or the plant be hung up, each leaf separate, in a warm kitchen." Practitioners ought annually to obtain a supply of the recent leaves, in the month of July, and dry them themselves; as in the herb shops they are often so ill dried as to appear black, in which state they are useless. The powder should be kept in closely-stopped opaque phials.

Qualities.—Recent foxglove leaves are inodorous; but in the dried state they have a slight narcotic odour, and a bitter nauseous taste. Both water and alcohol extract their virtues. The watery infusion has a pale olive-green colour, with the unpleasant odour and taste of the plant. It does not precipitate solutions of galls, tartarized antimony, nor sulphate of iron: the last only deepens its colour; but it precipitates infusion of yellow cinchona bark, produces a yellowish precipitate with bichloride of mercury, and a blackish violet very copious one with nitrate of silver. The dry powder, which should have a beautiful green colour, moistened and triturated with lime or calcined magnesia, and a glass rod dipped in hydrochloric acid held over it, exhibits copious white fumes, proving the presence of ammonia. The presence of ammonia is also apparent in the tincture; which is rendered milky by water.[1] Ten grains of the powder macerated in f ℥ss. of sulphuric ether lost three grains of its weight, and yielded all its colour to the ether; and the ethereal tincture, on being evaporated on water, left a pellicle of dark green, unctuous, resinous matter, whilst some yellowish extractive was dissolved in the water, and precipitated afterwards by chlorine. From this imperfect analysis, foxglove appears to contain ammonia, extractive, and a pea-green resinous matter in which its narcotic power resides. More recent analysis was supposed to have discovered a peculiar alkaline principle, which was termed Digitaline, or Digitalia. It is procured by digesting the leaves in ether, filtering and evaporating, and dissolving the residuum in water, which is filtered, and then treated with hydrated oxide of lead; which being evaporated, and the residuum digested in ether, yields up the digitaline, which is obtained in the separate state by evaporation. It is a brown pasty substance, very bitter, uncrystallizable and deliquescent; and restores the colour of paper

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[1] Destouches, a French chymist, who analyzed foxglove, obtained also much carbonate of ammonia by distilling the aqueous extract. He obtained, besides, sulphate of potash and of lime, phosphate of lime, carbonates of lime and of potash, and acetate of ammonia.

reddened with an acid[1]: but it is ascertained to be merely chlorophylle, resin, and a fatty matter.

Medical properties and uses.—Digitalis is directly stimulant, indirectly sedative[2], and diuretic. It at first quickens and fills the pulse; but afterwards weakens the force of all the vital functions; and, by a proper exhibition of it, the frequency of the pulse may be diminished any number of pulsations, and regulated at the pleasure of the practitioner; whilst at the same time it admits, to a certain extent, of the employment of such medicines as increase the firmness of the arterial action, and give tone to the habit. When given to the full extent of which the system can admit, it is apt to accumulate; the pulse intermits; and vertigo, indistinct vision, and nausea with vomiting or purging occur; and if, after these indications, the quantity be still increased, or if any considerable portion of the recent herb be inconsiderately swallowed, it produces delirium, hiccough, cold sweats, convulsions, syncope, and death. It is supposed to quicken the action of the absorbent system; but although the discharge of urine is very considerably increased during its use, and the load of water with which the body is oppressed in dropsies be thrown off, yet it is not easy to conceive how it can operate on the absorbents; and therefore the modus operandi of foxglove, in producing its diuretic effect, may be regarded as still unexplained[3], although it must probably operate as a direct stimulant to the kidneys.

As a *sedative*, foxglove was early used in some acute diseases, but its powers were not understood. It is employed in inflammatory diseases; in active hæmorrhages, particularly from the uterine vessels, when the pulse is sharp, throbbing, and frequent; in scrofula, and in most cases of increased vascular action, or in which it is essential to lessen the usual impetus of the blood, as in aneurism; but in such cases it should be administered in doses sufficiently large to induce, rapidly, its sedative influence. In mania it acts as a narcotic, soothing the nervous system and procuring sleep to the patient. The tincture is the best form of administering it in

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1 *Bib. Univ.* xxvi. p. 102.

2 This term implies, as I understand it, any substance which diminishes the action of the heart and arteries, without first increasing it.

3 Dr. Baildon observed a curious effect of posture in ascertaining the real effects of digitalis on the pulse. When, by gradually increased doses, he took it to the extent of grs. vj. in the day, the pulse fell to 40 from 110. But when it was actually at 40, the erect posture would raise it to 100; when sitting, it was 72; and when lying down, 40. He observed the same effect in several patients to whom he gave it.—*Edin. Med. and Surgical Journal,* iii. 271.

this disease; and the dose may be carried to an extent far beyond that which can be prescribed in any other disease. (See *Tinctura Digitalis*, Part III.)

It was prescribed in phthisis so early as 1710; and great praises were bestowed on it by a writer of that period.[1] Dr. Ferrier found its utility in this complaint much increased by combining it with myrrh and sulphate of iron[2]: but it has often proved hurtful in the early stage of the disease. Its use has also been extended to venereal ulcerations, chronic rheumatism, hooping cough, and some spasmodic affections. As an external application, it has long been used in Italy[3] to cleanse all sores; and Hufeland recommends it to be used in the form of fomentation for dispelling glandular swellings.

As a *diuretic*, the use of foxglove was re-introduced by Dr. Withering in 1775.[4] He found that its beneficial effects in dropsies were more certainly obtained in those constitutions in which there is a laxity of fibre, pale countenance, feeble intermitting pulse, and cold skin; and where the swelling easily pits. But in florid habits, with great strength, tense fibre, and hot dry skin, no diuresis follows. "If the belly in ascites be tense, hard, and circumscribed, or the limbs in anasarca be solid and resisting, we have but little hope."[5] Experience has confirmed these judicious observations; and it is found that where this favourable state does not exist, it should be produced by bleeding, and the free use of neutral salts, and calomel, before Foxglove is administered. The diuretic effect is checked when much nausea is present; and Withering says purging also checks it; but I have not found this to be the case. The kinds of dropsy in which its influence is most useful, are ascites, anasarca, hydrothorax, and that species of swelling which succeeds parturition, phlegmasia dolens, where the legs and thighs swell, become pale and semi-transparent, with pain in both groins, depending on inflammation of the veins. It has also been found of the greatest service, when conjoined with nitrous acid, in the dropsy which occurs in broken down constitutions, that have been long harassed by mercury.[6] Digitalis will not cure a dropsy attended with palsy, unsound viscera, or other complications of disease; but by allaying the urgency of the

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[1] *Salmon.* See *The Edin. Med. and Surg. Journal*, v. 303.
[2] *Essay on the Medical Properties of Digitalis.*
[3] Aralda (Digitalis) tutte piaghe salda.
[4] He was induced to try it from finding it the active ingredient in a family recipe for the cure of dropsy, regarding which his opinion was asked.
[5] *Withering's Account*, &c. 186.
[6] *Carmichael on Diseases which have been confounded with Syphilis*, 4to. p. 63-5.

symptons, it gains time for other medicines to act. No benefit has hitherto been obtained from its use in hydatids, ovarian dropsy, or in hydrocephalus.

Foxglove is administered in substance, or in decoction, or in the watery infusion, or in tincture, (see *Preparations*). When given in substance, it is frequently combined with aromatics, soap, or ammoniacum; and most advantageously with calomel and opium, when it is required only to produce its diuretic effect. It is always proper to begin with a dose not exceeding gr. j. of the powdered leaves, given in a pill twice a day; and gradually to increase it till its effects are apparent either on the kidneys, the stomach, the pulse, or the bowels. The medicine must then be discontinued; but in dropsy it may be repeated after an interval, if the whole of the water be not evacuated. During its employment, diluents are useful and necessary; and immediately it is discontinued, the strength should be recruited by generous food, steel, and cordial tonics. The deleterious effects of an overdose are to be counteracted by cordials, as brandy, mint tea, and opium; and when these are not sufficient, by blisters. When the dose has been given a short time only before medical aid is required, the decoction of yellow cinchona bark should be used with the stomach pump, instead of water.

Officinal preparations.—*Decoctum Digitalis*, D. *Infusum Digitalis*, L. E. *Tinctura Digitalis*, L. E. D.

DIOSMA. *Spec. Plant. Willd.* ii. 1133.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Rutaceæ.

G. 426. *Corolla* consisting of five petals. *Nectaries* five above the germen. *Caps.* three to five, united. *Seeds* calyptrate.

Spec. 22. D. *crenata.* Crenated Diosma. *Med. Bot. 3d edit. Thunberg, Prod.* 43. N. G. Agathama, *Willd.* Bucco, *Wendland.*

Officinal. DIOSMA, *Lond.* DIOSMA CRENATA. FOLIA. BUCHU, *Dub.* Buchu-leaves.

Syn. Buchu, Bocchoe (*Hottentot*).

This species of Diosma is a native of the Cape of Good Hope. The leaves are borne on the extreme twigs, nearly in a verticillated order; they are petiolate, coriaceous, alternate, sometimes opposite; ovato-lanceolate, nearly pointed, about an inch in length and half an inch in breadth, with the margin crenated; the upper surface is smooth, and of a beautiful bright green; the under is pale, and spread, with many translucent glandular points. The flowers are axillary, solitary, and have the leaflets of the calyx awl-shaped and crenated.

Qualities.—The dried leaves, to an inexperienced eye, might readily be mistaken for those of senna. The short petiole which remains attached to them is channelled: the upper surface is smooth, shining, and of a yellowish olive hue; the under surface is rugose, pale, and studded with large open glands, with an excretory pore in each. The leaves are generally mingled with reddish brown twigs, mottled near the apex with bright yellow, and notched from the separation of the leaves. The whole exhales a powerful, not unpleasant aromatic odour: the taste impressed on the tongue by chewing the leaves, at first resembles that of peppermint; but when chewed for some time, a pungency and sweetness are left on the tongue. These properties are imparted both to boiling water and to proof spirit. According to the analysis of M. Felix Cadet de Gassicourt, Buchu leaves yield of volatile oil 0·665 parts, gum 21·17, extractive 6·17, chlorophylle 1·10, and resin 2·151. Their active principles seem to depend on the volatile oil and the extractive.

Medical properties and uses.—Buchu leaves are excitant, sudorific, and diuretic. They have been employed for some years both in England and Germany; but, in Britain, have been admitted only lately into the London and the Dublin Pharmacopœias. They have been found useful in rheumatism, particularly when it assumes an intermittent character; in chronic catarrh; and in chronic inflammation of the bladder, and retention of urine. They are given in the form of infusion, made with half an ounce of the leaves to half a pint of boiling water.[1] The dose is from ten fluid drachms to a fluid ounce and a half, taken once in four hours.

Officinal preparations.—*Infusum Diosmæ*, L. *Infusum Buchu*, D. *Tinctura Buchu*, D.

DOREMA. *Don, Lin. Trans.* vol. xvi.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

Essent. Char. *Disk* epigynous, cup-shaped. *Achenia* compressed, marginate, with three distinct filiform intermediate ribs. The *Valleculæ* with one vitta. The *Commissures* with four vittæ.

Species. D. *Ammoniacum.* Ammoniacum Dorema. *Don, Linnean Trans.*

Officinal. AMMONIACUM, *Lond. Edin.* AMMONIACUM GUMMI, *Dub.* Ammoniac.

Syn. Gomme Ammoniaque (*F.*), Ammoniak (*G.*), Gomma Ammoniaco (*I.*), Goma Amoniaco (*S.*), Ushok or Feshook (*Arab.*), Semughbilshereen (*Pers.*).

The plant which yields this gum-resin is a native of Persia; it has at length been brought home by Colonel Wright, and described by Mr. David Don, under the name Dorema *ammoniacum.* The Dorema is now admitted as the true source of the drug.

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[1] The Hottentots employ a decoction of the fresh leaves as a vulnerary.—*Burchell's Travels in Africa.*

Mr. Jackson, in his account of Morocco, informs us, that the ammoniacum plant, which in the Arabic is named *feshook*, resembles the fennel [1], is ten feet in height, and one inch thick in the thickest part of the stem; and Colonel Johnson describes a plant as that yielding the ammoniacum, which appears to be the same as the feshook. The feshook grows at El-araiche and M'Sharrah Rumellah; and neither bird nor beast is seen near the spot; but it is attacked by a horned beetle, which perforates the stem with its horn, and the juice runs out at the wound. It rises about six feet in height; some of the stems are dark coloured, others of a light green, and tinged with lake-colour near the joints. The flowers are extremely minute, and congregated in small capitals: each flower, when examined by the microscope, is found to consist of five petals, curled inwards, with a kidney-shaped anther. The Dorema, says Mr. Don, is not unlike opoponax; but it is distinguished from opoponax, and also from ferula, by a large, cup-shaped, epigynous disk, completely sessile flowers, and solitary resiniferous canals. It is a robust plant, upwards of seven feet in height, and four inches in circumference at the lower part of the stem, of a glaucous colour, with a perennial root, and clothed with glandular pubescence. The leaves are large, petiolate, sub-bipinnate, with subtrijugate pinnæ: the lower leaflets are distinct, the superior confluent, incisopinnatifid, with oblong, mucronate, entire segments, rarely sublobate, coriaceous and veined on the under disk, supported on ribbed pubescent petioles, with the base greatly dilated, subvaginant, and stipulaceous. The flowers are produced on proliferous racemose umbels, supported on globose umbellules, with round, woolly peduncles. There is neither involucrum nor involucel. The flowers are sessile. The *calyx* is five-toothed at the margin, the teeth being small, ovate, acute, membranaceous. The *petals* are five, ovate, and acuminately inflex. The *stamens* are five, quickly caducuous; the *filaments* are flattened, and dilated at the base: the *anthers* are incumbent and bilocular, with loculi longitudinally dehiscent. The *ovaria* are roundish, with full, fleshy, cyathiform, plaited sublobulate segments. The *styles* are flattened, slightly channelled, with a dilated base. The *stigmata* are trunketed. The *fruit* is elliptical, greatly compressed at the back, with a flattened margin, and a broad cincture.[2] The

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[1] Both Dioscorides and Pliny describe ammoniacum as the juice of a species of ferula growing in Libya.—*Dioscor.* l. iii. c. 98. *Plin.* l. xii. c. 23.

[2] *Linn. Trans.* vol. xvi. p. 605. Merat and De Lens have published some notices of the plant, in the *Dict. Universel de Matière Medicale*, 1829; and an account of it is also contained in *Trans. of the Med. Soc. of Calcutta*, vol. i.

plant is called *Oshac* by the Persians: it is perennial, and grows wild between Yerdekaust and Kumisha, in the province of Irauk, exposed to an ardent sun. When the plant has attained perfection, it is pierced by innumerable beetles; the ammoniacum exudes, and when dry it is picked off. The ammoniacum, besides exuding from these punctures, is procured by incisions also, and allowed to drop on the ground, where it hardens by the air and sun; on which account that from Barbary is mixed with a red earth, and is not saleable in the London market. The best ammoniacum is brought from the East Indies, packed in cases and chests. It is in large masses, composed of small round fragments or tears; or in separate dry tears, which is generally considered a sign of its goodness.

Qualities.—Ammoniacum has a peculiar faint but not ungrateful smell; and a bitter, nauseous, sweet taste. The tears are yellow on the outside, and white within; brittle, and break with a vitreous fracture. Their specific gravity is 1·207. Ammoniacum is adhesive in the warm hand, softens by heat, but does not melt; and is partially soluble in water, alcohol, ether, solutions of alkalies, and vinegar. When triturated with water the solution is milky, but after some time it lets fall a resinous matter, which is the part of the ammoniacum that is taken up by ether and alcohol. Water or alcohol, when distilled off ammoniacum, brings over nothing from it. According to the analysis of Braconnot, it is composed of 70·0 parts of resin, 18·4 gum, 4·4 glutinous matter, and 6·0 water, in 100·0 parts; 1·2 parts being lost in the analysis.[1] I find that sulphuric ether takes up six grains in ten of ammoniacum, and, when evaporated, leaves a yellowish white resin[2], which is long of hardening, and is insipid, although it possesses the odour of the gum-resin: the taste resides in the gum, which in other respects possesses the properties of acacia gum. Water, therefore, is the proper menstruum for ammoniacum.

Medical properties and uses.—Ammoniacum is a stimulating expectorant, deobstruent, and antispasmodic; and is in large doses purgative. Externally it is discutient and resolvent. It is prescribed with advantage in asthma, chronic catarrh, and some other pulmonary affections; but, on account of its stimulating properties, its use must be avoided where any inflammatory action of the chest is going forward. As a deobstruent it is useful in visceral obstructions, hysteria, and chlorosis;

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[1] *Annales de Chim.* lxviii. 69. *Thomson's Chymistry*, v. 143.

[2] Nitric acid converts this resin into a yellow resino-bitter, which imparts a permanent yellow colour to silk.

and in that peculiar state of the bowels often accompanying hypochondriasis and dyspepsia, in which there is an almost constant degree of colic, particularly after taking food, and which appears to arise from a viscid mucus lodged in the intestines, a combination of ammoniacum and rhubarb is singularly efficacious. As an antispasmodic, Cullen properly considers it the least powerful of the fœtid gum resins. It may be combined with tartarized antimony, squills, assafœtida, and ipecacuanha, to promote its expectorant powers; and with myrrh, iron, and bitters, when its deobstruent properties are required. It is given either in substance, or diffused in water in the form of emulsion. Externally, it is applied under the form of plaster to scirrhous tumours and white swellings of the joints. (See *Preparations and Compositions.*)

The dose of ammoniacum is from grs. x. to grs. xxx.

Officinal preparations.—*Mistura Ammoniaca,* L. D. *Emplastrum Ammoniaci,* L. *Emplastrum Ammoniaci cum Hydrargyro,* L. *Emplastrum Gummosum,* E. *Pilulæ Scillæ compositæ,* L. E.

DORSTENIA. *Spec. Plant. Willd.* i. 682.

Cl. 4. *Ord.* 1. Tetrandria Monogynia. *Nat. ord.* Artocarpeæ.

G. 244. *Receptacle* common, one-leafed, fleshy, in which solitary seeds are nestled (or placed in sockets without attachment).

Species 5. D. *Contrajerva,* Contrayerva. *Med. Bot. 3d edit.* 705. *t.* 240.

Officinal. CONTRAJERVA, *Lond.* DORSTENIÆ CONTRAYERVÆ RADIX, *Edin.* Contrajerva root.

Syn. Contrajerva (*F.*), Giftwurzel (*G.*), Contrajerva (*Dutch*), Contraherva (*Port.*), Contrajerva (*I.*), Contrahierba (*S.*).

This is a perennial plant, a native of Peru, Mexico, and some of the West India islands. The root is fusiform, knotty, and branching, compact, furnished with many rough fibres; externally of a brown colour, and internally whitish. It sends up several leaves, which are about four inches in length, and the same in breadth; of an irregular shape, but in general deeply lacinated into five or seven obtuse parts; and placed on long radical footstalks, winged towards the leaves. The fructification, which is remarkable, and on radical stalks or scapes, which rise about four inches high, is a fleshy receptacle, shaped like an animal placenta, about an inch long, and three fourths of an inch broad, placed vertically; and containing on the upper surface very small, scarcely conspicuous, flowers, situated closely together, immersed in the receptacle, and occupying the whole of its disc. The capsule possesses an elastic power when ripe, by which the seeds are thrown out with considerable force.

Monardus is the first author who mentions this root, which, he says, is called Contrajerva[1] by the Spanish Indians, on account of its alexipharmic qualities. Dr. Houston[2], however, asserted that the officinal contrajerva was the root of two other species of Dorstenia, the D. *Houstonia* and D. *Drakena* of Willdenow; but the British Colleges follow the authority of Linnæus. It is brought to this country from the West Indies, packed in bales, in pieces of about two inches long.

Qualities.—Contrajerva root has a peculiar but not unpleasant odour, and a bitterish warm taste, leaving a pretty lasting impression on the tongue. It preserves its qualities when dried, and in the state of powder. Both water and alcohol, assisted by heat, extract its virtues. The watery decoction is of a dark brownish red colour, and exceedingly mucilaginous.—The alcoholic tincture reddens litmus paper, is not altered by a solution of sulphate of iron, but is precipitated by water.

Medical properties and uses.—This root is a stimulant sudorific and tonic. Huxham and Pringle first pointed it out as a remedy well suited to fevers of a typhoid type; and it is often employed in malignant eruptive diseases, dysentery, and in some kinds of diarrhœa. It is also useful in atonic gout, chronic rheumatism, and the fever attending dentition in weak infants.

The dose of the powdered root is from grs. x. to ʒ ss.; but it is seldom used alone.

DRYMIS. *Spec. Plant. Willd.* ii. 1239.

Cl. 13. *Ord.* 4. Polyandria Tetragynia. *Nat. ord.* Winteraceæ.

G. 1063. *Calyx* three lobed. *Petals* six or twelve. *Germens* club-shaped. *Style* none. *Berries* four or eight, obovate.

Species 1. D. *Winteri.* Winter's Bark-tree. *Phil. Trans.* xviii. 923. t. 1. f. 1, 2. *De Candolle, Syst.*

Officinal. WINTERÆ AROMATICÆ CORTEX, *Edin.* DRIMYS AROMATICA; CORTEX, *Dub.* Winter's bark.

Syn. Cannelles de Winter (*F.*), Winterana (*I.*), Corteza Winterana (*S.*).

The tree yielding Winter's Bark is a native of the Straits of Magellan, growing in valleys which are exposed to the sun. It is a tall evergreen tree; covered on the trunk with a grey wrinkled bark, which is smooth and green on the branches. The leaves are petiolate, elliptical, obtuse, smooth, an inch and a half in length, and an inch broad in the middle,

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[1] The Spanish, for the English word *antidote*, is *contrahiérba.* The Mexican name of the root is *Tazpatlas.*

[2] *Phil. Trans.* No. 421. p. 195.

and of a light green colour. The flowers are axillary, two, three, or more together, on short peduncles of a milk-white colour, with the odour of jasmine: the petals are unequal, oval, obtuse, concave, and erect, the filaments shorter than the petals, supporting large oval anthers; and the germens turbinated, with large sessile divided flat stigmas. The berries are of a light green colour, spotted with black, and contain several black aromatic seeds.

This tree was discovered in 1577, by Captain Winter, the crew of whose ship used the bark as spice. It is not often found in the shops: and is frequently confounded with the Canella alba; from which it may be distinguished by being in larger pieces, and having more of a cinnamon hue.

Qualities.—Winter's bark has an aromatic odour; and a pungent, hot, spicy taste, slowly imparted but very permanent. These qualities depend on a volatile oil, which can be obtained separate, in distillation with water. M. Henry obtained also resin, tannin[1], a colouring matter, acetate of potassa, chloride of potassium, sulphate of potassa, oxalate of lime, and oxide of iron, from this bark.

Medical properties and uses.—This bark is stomachic and carminative. It has been found efficacious in scurvy, and may be used as an adjunct to simple bitters in dyspepsia; but it does not appear to be superior to Canella alba, and is very little used. On the Continent it is given in the forms of powder, tincture, and infused in wine.

EUPHORBIA.[2] *Spec. Plant. Willd.* ii. 881.

Cl. 11. *Ord.* 3. Dodecandria Trigynia. *Nat. ord.* Euphorbiaceæ.

G. 959. *Corolla* four or five petalled, fixed to the calyx. *Calyx* one-leafed, ventricose. *Capsule* tricoccous.

* *Fruticosæ, aculeatæ.*

Species 2. E. *Canariensis.*

Species 7. E. *Officinarum.*[3] E. *Antiquorum.* Officinal Euphorbium plant. *Amœnit. Acad.* vol. iii. p. 102. *Jackson's Morocco,* p. 81. *fig.?* Kol-Quall, *Bruce's Abyssinia,* vol. v. p. 41. *fig.?*

Officinal. EUPHORBIÆ GUMMI RESINA, *Lond.* Euphorbium.

Syn. Euphorbe (*F.*), Euphorbium (*G.*), Winkel-euphorbium (*Dutch*), Pruskäda (*Swed.*), Euforbio (*I.*), Euphorbio (*S.*), Saynd kadood (*H.*), Ukcil Nefsch (*Arab.*), Nura-shÿ (*Beng.*), Shuddraykullu pomt (*Tam.*).

This is a perennial, succulent, shrubby plant, a native of Africa, where it grows in great abundance. The plant de-

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[1] Canella alba contains no tannin.

[2] Antonius Musa and Euphorbus were brothers: the former was physician to Augustus Cæsar; the latter to Juba, king of Lybia. Cæsar raised a statue to Musa: Juba named this plant after Euphorbus. "Ubi jam Musæ statua? Peritt! evanuit! Euphorbi autem perdurat, perennat, nec unquam destrui potest."—*Crit. Bot.* 86.

[3] Δένδρον εὐφορβίον Dioscoridis.

scribed and figured by Bruce under the name of *Kol-Quall*, and that which Jackson, in his Account of Morocco, says the Arabs and Shellahs call *Dergmuse*, appear to be the same or varieties of the E. *Officinarum*. When arrived at maturity it has a simple, erect, round stem, about five feet high; angled or furrowed with eighteen or more longitudinal fissures. From the summit branches are thrown out in every direction, going off first horizontally, and then ascending, so as to give to the whole plant the appearance of the skeleton of a large goblet supported on a stalk or foot. The branches are about an inch in diameter, more distinctly angled than the stem, scolloped, and furnished with prickles everywhere double: it has no leaves, but instead of them, tubercles, adjoining to each pair of prickles. The flowers are sessile, on the extremities of the branches, of a crimson colour. The calyx is of one piece, persistent, with a four or five toothed lip. The petals are four, turbinated, gibbous, thick, truncated, unequal in situation, and fixed by claws to the margin of the calyx. The filaments are more than twelve, thread-like, longer than the corolla, coming forth at different times, and carrying each two globular anthers: the germen is trigonous, with a simple short style, crowned with three semibifid obtuse stigmas. The capsule is tricoccous, pedicellated, elastic; with round solitary seeds.

The succus proprius of all the species of euphorbia is white, and concretes by exposure to the air into a solid substance. The euphorbium brought to this country is said to be the product of some other species, besides the plant we have described: for instance, E. *antiquorum* and E. *Canariensis* of Willdenow. Mr. Jackson says, that in the lower regions of Mount Atlas the inhabitants collect the concreted gum resin, which they call *furbiune*, in September. It is obtained by making slight incisions in the branches of the plant with a knife, from which a milk-like juice exudes, and forms into tears of an oblong or roundish form. The quantity yielded is so considerable, that the plants are cut once only in four years; the supply then obtained being sufficient for that space of time for all Europe. The recent juice is so corrosive as to erode the skin wherever it touches; and the people who gather the gum are obliged to tie a cloth over the mouth and nostrils, to protect them from the acrid dust of the withered branches, which induces the most violent sneezing.[1]

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[1] Bruce says, "When the tree (Kol-Quall) grows old, the branches wither; and, in place of milk, the inside appears to be full of powder, which is so pungent, that the small dust which I drew upon striking a withered branch seemed to

Euphorbium is imported in serons, each of which contains from 100 to 150 lbs. weight. It is in small, hollow, somewhat forked pieces, which appear as if the euphorbium had concreted round the pedicels of the flowers; and it is often mixed with the tricoccous seeds, and other impurities.

Qualities.—It is inodorous; and when first chewed has little taste, but it soon gives a very acrid, burning impression to the tongue, palate, and throat, which is very permanent, and almost insupportable. Its specific gravity is 1·124. Water, when triturated with it, is rendered milky, but actually dissolves one seventh part only of the quantity employed: alcohol dissolves one fourth part, and affords a clear straw-coloured tincture, which is rendered milky by the addition of water: ether takes up six parts in ten, forming an opaline infusion. When the ethereal tincture is evaporated on water, it leaves on the side of the glass a pellicle of transparent resin, and on the water a cake of opaque adhesive whitish matter, which I found to consist of wax and resin, resembling an officinal plaster; while the water is rendered milky. The acrimony resides in the resinous matter. The analysis of Braconnot[1] makes 100 parts of Euphorbium to contain 37·0 of resin, 19·0 wax, 20·5 malate of lime, which was mistaken for gum, 2·0 malate of potassa, 5·0 water, 13·5 woody matter, and 3·0 loss. He regards the resin as peculiar, from its being insoluble in alkalies, but soluble in the sulphuric and nitric acids.

Medical properties and uses.—Euphorbium possesses powerful cathartic, emetic, errhine, and rubefacient properties. It has been given as a hydragogue in dropsies; but owing to the violence of its effects, its internal use is now exploded: neither as an errhine can it be used alone; for it occasions so much inflammation as to produce hæmorrhage from the nostrils, and swell the integuments of the head. When properly diluted, however, with starch or any other inert powder, and cautiously used, it is an effectual and excellent errhine in lethargy, deafness, palsy, amaurosis, and similar cases.

FARINA. Vide *Triticum hybernum.*

FERRUM. Iron.

Syn. Fer (*F.*), Ferro (*I.*), Eissen (*G.*), Yzer (*Dutch*), Jern (*Dan. Swed.*), Ferro (*Portug.*), Zelaco (*Polish*), Hierro (*S.*), Loha (*H. Duk. Sam.*), Ayas (*San.*), Sōw-ik (*Esquimaux*), Sheljeso (*Russian*), Eerumboo (*Tam.*), Ahun (*Pers.*), Hedeed (*Arab.*), Bessee (*Malay*), Yakada (*Cyng.*).

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threaten to make me sneeze to death, and the touching of the milk with my fingers excoriated them as if scalded with boiling water."—*Appendix*, 4to. p. 43.

[1] *Annales de Chimie*, lxviii. 44.

This metal is one of the most abundant metallic productions of nature. Its ores are found in almost every part of the globe, but that of Sweden is most esteemed. It is also contained in the soil; often in the water; and as a constituent of vegetable and animal bodies. Iron is procured,

A. In its metallic state:

i. Alloyed with lead and copper.	Sp. 1. *Native iron.*	
——— with nickel.	2. *Meteoric Iron masses.*	
ii. Sulphureted.	1. *Iron pyrites.*	Var. *a.* Common.
		b. Radiated.
		c. Hepatic.
		d. Capillary.
		e. Cellular.
	2. *Magnetic pyrites.*	

B. United with oxygen:

iii. Oxidized.	1. *Magnetic iron stone.*	Var. *a.* Common.
		b. Iron sand.
	2. *Spicular iron ore.*	Var. *a.* Common.
		b. Micaceous.
	3. *Red iron stone.*	Var. *a.* Red scaly iron ore.
		b. Red ochre.
		c. Compact.
		d. Red hæmatite.
	4. *Hydrate of iron.*	Var. *a.* Brown hæmatite.
		b. Compact hydrate.
		c. Globular hydrate.
		d. Ochrey brown iron stone.
		e. Bog iron ore.

C. Acidified:

	5. *Hydrate of iron and manganese.*	
iv. Salts.	1. *Carbonate.*	Var. *a.* Sparry iron ore.
		b. Com. clay iron ore.
	2. *Phosphate.*	Var. *a.* Phosphate of iron.
		b. Blue iron earth.
	3. *Arseniate of iron.*	
	4. *Chromate of iron.*	
	5. *Silicate.*	
	6. *Tungstate.*	
	7. *Sulphate.* Var.	*a.* Pitchy iron ore.

Metallic iron can be extracted from all of these ores, but the oxides are those more commonly wrought; and, in this country, the argillaceous ironstone and the red hæmatite are the kinds in general use. The process varies in different places, but the principles on which it is conducted are every where the same. The ore is first roasted by placing it, after it is broken into small pieces, in alternate strata with small coal and lime, either in a kiln, or built up in a pyramidal form on the ground, and setting fire to the lowest stratum of coal. The lime acts as a flux, and forms with the impurities of the ore a fusible slag. This part of the process expels any sulphur, water, or carbonic acid, with which the ore may be combined; and it is then smelted with coke in a conical furnace of the strongest masonry; the heat being raised to a very high degree by passing a blast of condensed air through the furnace; and to facilitate the separation of the melted metal, lime is used as a flux. The scoria or slags are drawn out through an opening towards the bottom of the furnace; and the melted metal, which is collected in a cavity at the bottom, is run off into moulds. In this state it is called pig, or cast iron; and requires to be again fused and submitted to the action of the hammer, or passed between rollers, before it is sufficiently pure either for the majority of the purposes of art or of medicine.[1]

Pure forged or bar iron is of a bluish white or grey colour, of a fibrous texture, and very brilliant in the fracture. It emits a peculiar odour when rubbed, and has a styptic taste. Its specific gravity varies from 7·6 to 7·8. It is attracted by the magnet, and becomes magnetic; properties which distinguish it from all other metals. It is very malleable, but less so than gold, silver, or copper; and is more ductile, tenacious, and elastic, than any other metal.[2] Iron can be ignited by percussion, and melts at 158° of Wedgwood. Its surface is soon tarnished and oxidized when exposed to the air; and the oxidizement is much hastened by the presence of water, which it decomposes.[3] Percussion at a high temperature separates from its surface oxidized scales; the sparks produced by its collision with flint are oxidized; and in the state of wire, when made red hot at one extremity, and introduced into a bottle of pure oxygen gas, it burns with great splendour, and is oxidized in globules. The equivalent of iron is 28.

Iron is of all the metals the least injurious to the animal system, being in no respect poisonous, even when rendered active by oxygen. It was medicinally used by the ancients; for Dioscorides, we know, employed it quenched in wine as a

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1 The mines of the Lower Harz yield annually 14,000 tons of ore.

2 A square inch of iron wire requires 113,000 lbs. avoirdupois to pull it asunder: the same quantity of copper wire requires 61,000: of platinum wire 56,000: silver wire 40,000; and gold wire 31,000.

3 When iron exposed to a moist atmosphere rusts, a protocarbonate is first formed; by degrees the protoxide passes into the hydrated peroxide, and the carbonic acid is evolved; a simple oxide combined with some ammonia remains.

remedy for dysentery; and its use was by no means unfrequent as an external application for the cure of malignant ulcers. The effects of iron, or rather its oxides, however, as an internal remedy, were very little understood until more modern times. It acts as a powerful tonic, increasing the general excitement, promoting the digestive powers and healthy secretions, giving a more florid hue to the blood, and augmenting in a great degree the energy of the muscular fibres. It answers the intentions for which it is prescribed more effectually when it is given in small doses, minutely divided, as it is found in chalybeate springs, and its use long continued. The diseases in which it is used are those which are dependent on, or attended with a weak, languid, leucophlegmatic habit of body, as chlorosis, hysteria, dyspepsia, fluor albus, gleet, passive hæmorrhages, palsy, scrofula, rickets, and the last stage of phthisical affections; it is also beneficial in convalescence from almost all acute diseases, and has been lately recommended as a specific in cancer. The use of iron is contra-indicated whenever the inflammatory diathesis prevails, or there is any particular fulness of the vessels; or an increased secretion of bile, particularly in sanguineous habits. In these states of the system it occasions heat, thirst, headach, laborious respiration, and many other unpleasant symptoms; but when in a proper state of the body, few medicines are capable of producing more beneficial effects.

For the purposes of medicine, soft malleable iron undergoes various preparations (see *Preparations and Compositions*): but at present we have to notice it only as it is mentioned in the lists of materia medica of the British Pharmacopœias.

1. METALLIC IRON.

Officinal. FERRUM, *Lond.* FILA ET LIMATURA, *Edin.* FERRI FILA, SCOBS, *Dub.* Iron filings and wire.

Syn. Limailles de Fer (*F.*), Gopulvertes Eissen (*G.*), Limatura di Ferro (*I.*), Limadura de Hierro (*S.*), Cerumboo podie (*Tam.*), Sōw-ik (*Esquimaux*).

These filings are obtained from the workers in iron; but, as they are often mixed with copper and brass filings and other impurities, it is necessary, in order to purify them, to draw them upwards through a sieve or piece of coarse gauze, with a magnet.

Medical properties and uses.—Metallic iron exerts no action on the living system, unless it meets with acid in the stomach, in which case it becomes tonic. Iron filings, therefore, are not adapted for all the cases in which chalybeate remedies prove useful; and are chiefly suited to those cases of dyspepsia, hysteria, chlorosis, and general debility, which are accompanied with acidity in the first passages. When iron is oxidized by the assistance of watery fluids, hydrogen gas is evolved: hence, when the filings are rendered active in the stomach, fœtid eructations are produced, and the fæces are coloured black; which are evident symptoms of the medicine having taken effect. As an anthelmintic, iron filings may operate mechanically, and dislodge worms; but even in worm cases, the oxidizement of it in the stomach renders it more useful. Iron filings reduce the salts of copper to metal, hence they are administered in cases of poisoning by these salts. They are employed as anthelmintics in ascarides, the oxyuris *vermicularis.* Sydenham preferred iron filings to the salts of iron, in hysteria and hypochondriasis; but modern practitioners have not followed him in this respect.

Iron wire is useful for pharmaceutical preparations, on account of the purity of the iron from which it is made: as the softest and purest iron only can be drawn.

The filings are given in the form of powder combined with some aromatic, or made into an electuary with honey, or in pills in combination with myrrh, ammoniacum, assafœtida, or some bitter extract. The dose may be from grs. v. to ʒ ss.

Officinal preparations.—*Ferri Limatura purificata,* E. *Oxidum Ferri Nigrum purificatum,* E. D. *Subcarbonas Ferri præparatus,* E. *Rubigo Ferri,* D. *Ferri Sulphas,* L. E. D. *Ferrum tartarizatum,* L. *Tartras Potassæ et Ferri,* E. *Tartarum Ferri,* D. *Tinctura Acetatis Ferri,* D. *Liquor Ferri alkalini,* L. *Vinum Ferri,* L. D. *Sulphuretum Ferri,* E.

2. PERCYANIDE OF IRON.

Officinal. FERRI PERCYANIDUM, *Lond.* FERRI CYANURETUM, *Dub.* Prussian Blue.

Syn. Hydrocyanate de Fer, Prussiate de Fer, Bleu de Prusse (*F.*).

This salt was originally the production of accident. In 1710, Dippel, a celebrated German chymist, furnished a colour-maker of Berlin, named Diesbach, with a quantity of vegetable alkali prepared from blood, with which he intended to prepare a lake, by precipitating cochineal, alum, and sulphate of iron, with potassa; but instead of the lake, a beautiful blue was produced. This pigment was continued to be formed in the same manner; but it was not till twenty years afterwards that the method of preparing it was made public, and the preparation named *Berlin* or *Prussian blue.* It is now prepared by calcining 100 parts of the carbonate of potassa of commerce with 25 parts of animal charcoal made from blood: horn and other animal matters are next added, and again 25 parts of animal charcoal. This mixture is continued in the furnace, and constantly stirred until only a blue flame is given out; it is then taken from the fire, and thrown into water, in which, after brisk stirring, it is left at rest. In twenty-four hours the fluid is decanted, evaporated, and crystallized. To a solution of the hydrochlorate of the tritoxide of iron a solution of the above salt is added, as long as a precipitate is thrown down: the supernatant fluid is then decanted off; and the precipitate, well washed with boiling water, and dried, is Prussian blue. It may be more readily prepared by adding a solution of ferrocyanide of potassium to a solution of sulphate of peroxide of iron, acidulated with sulphuric acid. After the subsidence of the precipitate, the supernatant fluid is to be drawn off, and cold water, acidulated with sulphuric acid, added; and this repeated several times. The precipitate is then to be washed with pure water, and dried.

By the above process, the calcination of the alkali with the blood and bones azotizes it; and hydrocyanic acid is formed: the union of the hydrocyanic acid with the oxide of iron forms the Prussian blue, or a ferro-sesquicyanide of iron.

Qualities.—Prussian blue is of a rich deep blue colour, insipid, inodorous, and much heavier than water, in which it is insoluble. If exposed to the air it partly loses its blue colour, and becomes greenish: but again changes to blue when placed in contact with deoxygenizing substances. When submitted to a very strong heat, it is decomposed, giving out some pure water, then a small quantity of hydrocyanate of ammonia, carbonate of ammonia, and a residue, which, when calcined in a current of air, is oxide of iron.

Medical properties and uses.—Prussian blue has been occasionally used as a medicine. Dr. Zollikoffer, an American physician, gave it successfully in agues and remittent fevers, in doses of one grain, repeated several times a day. He gives it during the paroxysm, and affirms that it does not disagree with the most irritable stomachs. Dr. Bridges, another American physician, recommends it in neuralgia. The dose for an adult is gr. iv. three times a day. Dr. Kirchoff prescribed it with advantage in epilepsy, in doses of gr. j. increased to grs. iij. As an external application, an ointment, formed with ʒj. to ℥j. of cetaceous ointment, is used in cases of cancerous ulceration. It is admitted into the Pharmacopœia chiefly for preparing bicyanide of mercury and hydrocyanic acid.

Officinal preparations.—*Hydrargyri Bicyanidum*, L. *Cyanuretum Hydrargyri*, D. *Acidum Hydrocyanicum dilutum*, L. *Acidum Prussicum*, D.

3. OXIDIZED IRON.

Officinal. FERRUM; SQUAMÆ OXIDI, *Dub.* The Scales of the Oxide of Iron.

Syn. Bluettes de Fer (*F.*), Eissenoxyd (*G.*), Scaglio di Ferro (*I.*), Escamas de Hierro (*S.*).

These scales are detached by the hammer of the smith from the surface of iron heated to redness in the forge, and hammered on the anvil.

Qualities.—They are inodorous and insipid, attracted by the magnet, sp. gr. 3·5, brittle, and reducible by trituration to a powder, which is of a dull, greyish black colour. They consist of both protoxide and peroxide: the proportion in the outer layer being one equivalent of the peroxide and four equivalents of the protoxide: the inner consists of one equivalent of the peroxide and six equivalents of the protoxide. This mixed oxide is soluble in acids, without producing hydrogen gas.

Medical properties and uses.—These scales are used in the same cases and in the same manner as the filings, and are preferable; for, as they do not produce hydrogen gas when dissolving in the stomach, their use is unaccompanied by the distension and flatulence which the filings often occasion.

FERULA. *Spec. Plant. Willd.* i. 1411.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 539. *Fruit* oval, compressed, plane, three streaks on each side.

Species 11. F. *Assafœtida.*[1] Assafœtida. *Kœmpfer, Amœnitates Exoticæ,* 535. *t.* 536, *icon.* *Med. Bot.* 3*d edit.* 1. p. 111. *t.* 43.

Officinal. ASSAFŒTIDA, *Lond.* ASSAFŒTIDÆ GUMMI-RESINA, *Edin. Dub.* Assafœtida.

Syn. Assafœtida (*F.*), Stinkender Asand (*G.*), Assafetida (*I.*) Asafetida (*S.*), Pérungӯum (*Tam.*), Ingarva (*Tal.*), Angoo (*Malay*), Ungoozeh (*Pers.*), Duivelsdreck (*Dutch*), Dyrelsdraek (*Dan.*), Dyfvelstrack (*Swed.*), Hilteet (*Arab.*), Hing (*H.*), Hingoo (*San.*), Jo-eul (*Chinese*).

This species of ferula is a native of the south of Persia, chiefly growing on the mountains in the provinces of Khorasaan and Laar, where it is named *hingish.* The root is perennial, tapering, and ponderous; when fully grown, the size of a man's leg, covered with a blackish-coloured bark, and near the top beset with strong rigid fibres. The internal substance is fleshy, white, and abounds with a thick, very fœtid milky juice. The stem is round, smooth, and furnished with

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[1] Σιλφιον μηδικον Dioscoridis. The plant described and figured by Dr. Hope of Edinburgh, in the 75th volume of the *Philosophical Transactions,* as that which yields the officinal assafœtida, is the Ferula *Persica* of Willdenow, and a native of the north of Persia. Some suppose that the Ferula *Persica* yields the sagapenum. The name *Asa* (not Assa) *fœtida* is said to have been imposed by the monks of the school of Salernum.

leafless sheaths; it rises erect to the height of nine feet, and is about seven inches in circumference at the base; surrounded with six or seven radical leaves, nearly two feet long, bipinnate, with alternate pinnules, smooth, sinuated, lobed, or lanceolate; of a deep green colour, and fœtid odour. The flowers are in plano-convex, terminal, compound umbels; the seeds oval, flat, foliaceous, of a reddish brown colour, rough, with three longitudinal lines; and have a porraceous odour, and a sharp bitter taste.

When the root is four years old, it is fit to yield the assafœtida, which is procured in the following manner:—At the season when the stem and leaves begin to decay, they are twisted off from the root, which is then exposed by digging away the earth that surrounds it. It is left in this state screened from the sun for forty days; then the top is cut off transversely, and after forty-eight hours the juice which has exuded is scraped off, and another transverse section is made. This operation is repeated three successive times, and then the root is allowed to remain untouched for eight or ten days, before another section is made. The root perishes after it is exhausted of the juice. The juice collected from a number of roots is put together and dried in the sun.

Assafœtida is brought into this country packed in cases, mats, and casks; that in the cases proving generally the best. It is in irregular masses, adhering to each other, externally of a brownish yellow colour, and containing many little shining tears of a whitish, reddish, or violet hue. The best is clear, and of a pale reddish colour, contains many of the white tears, and has the odour very strong.

Qualities.—Assafœtida has a strong, very disagreeable, alliaceous, fœtid odour, and a bitter subacrid taste; but these qualities, particularly the odour, on which much of the efficacy of the drug depends, are injured by keeping.[1] It becomes brittle by exposure to the air; but is not easily reduced to powder, unless it be triturated with carbonate of ammonia. Its specific gravity is 1·327. It yields all its virtues to ether and to alcohol. It is diffused by trituration in water, forming a milky opaque mixture. The ethereal tincture, when evaporated on water, leaves a thick pellicle of brown, fœtid resin, and gives the water a milky appearance. In distillation, either with water or with alcohol, assafœtida yields an essential oil, on which its odour depends. Its components, according

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[1] Kœmpfer says:—"Affirmare ausim drachmam unam, recens effusam, majorem spargere fœtorem quam centum libras vetustioris, quem siccum vennudant aromatarii nostrates."—*Amœn. Exoticæ*, p. 535.

to Tromsdorff, are a volatile light oil, a heavy oil, a brown resin, and a bitter nauseous extractive, in which the alliaceous odour of the drug resides: I have obtained gum 60, resin 30, and essential oil 10 parts, in 100; but Brugnatelli affirms that the part which has been regarded as gum is extractive.[1] Pelletier makes its components to be—resin 65·00, gum 19·44, bassorine 11·65, volatile oil 3·60, supermalate of lime and loss 0·30=100.

Medical properties and uses.—This gum resin is an excitant, antispasmodic, expectorant, emmenagogue, and anthelmintic. It was used by Hippocrates under the name of Laserpitium. It was also employed by Dioscorides, chiefly as an expectorant.[2] It is more efficacious than any of the other fœtid gums, producing its effects in a shorter space of time: and is therefore beneficially given as an antispasmodic in cases of hysteria, hypochondriasis, dyspepsia, flatulent colic, the flatulence of hypochondriasis, tympanitis, and in nervous diseases: its expectorant powers have been found useful in asthma and hooping-cough; and it ranks high as a remedy in chlorotic affections. We are informed that in India it is a successful native specific against the Guinea[3] worm. Its use is contra-indicated when the inflammatory diathesis is present; and, owing to its stimulant quality, it is often combined with antimonials and nitre. It is used locally, in the form of enema, in worm cases, flatulent colic, and in the convulsions attending dentition; and sometimes it is applied as a plaster for discussing tumours.

The dose is from grs. v. to ℈j. formed into pills, or diffused in water. Owing to its nauseous character it is best administered in the form of pills. Six drachms of assafœtida beaten with ʒss. of camphor forms a proper mass for a plaster.

Officinal preparations.—*Mistura Assafœtidæ*, L. D. *Tinct. Assafœtidæ*, L. E. D. *Spiritus Ammoniæ fœtidus*, L. D. *Tinct. Castorei comp.*, E. D. *Pilulæ Assafœtidæ compositæ*, E. *Pilulæ Aloes et Assafœtidæ*, E. *Pil. Galbani comp.*, L. *Enema fœtidum*, D.

FICUS. *Spec. Plant. Willd.* iv. 1131.

Cl. 23. *Ord.* 2. Polygamia Diœcia. *Nat. ord.* Urticaceæ.

G. 1931. *Common receptacle* turbinate, fleshy, converging, concealing the florets, either in the same or a distant individual.

Male. *Calyx* three-parted. *Corolla* 0. *Stamens* three.

Female. *Calyx* five-parted. *Corolla* 0. *Pistil* one. *Seeds* covered by a permanent, closed, somewhat fleshy calyx.

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[1] *Compendio di Mat. Med.* p. 41. Pavia, 1817.

[2] It is used as a condiment in Persia; and by the Brahmins in India.

[3] *Edin. Med. Journ.* ii. 304.

* *Leaves lobed.*

Species 1. F. *Carica.*[1] The Fig-tree. *Med. Bot. 3d ed.* 714. *t.* 244.
Officinal. FICI, *Lond.* FICI CARICÆ FRUCTUS, *Edin.* FRUCTUS SICCATUS, *Dub.* The preserved fruit of the Fig.

Syn. Figue (*F.*), Feigen (*G.*), Vyge (*Dutch*), Figen (*Dan.*), Fiken (*Swed.*), Fico (*I.*), Higo (*S.*), Simie Attil pullum (*Tam.*), Unjeer (*Pers.*), El Kermos (*A.*).

The fig tree is a native of Asia, but was introduced into Europe in the early ages. It flourishes in France, Spain, and Italy, and even sometimes ripens its fruit in England.[2] It flowers in June and July. It seldom rises above twelve feet in height, but sends off many spreading branches: and the trunk, which exudes a milky odorous fluid when wounded, is covered with an ash-coloured bark, and seldom exceeds seven inches in diameter. The leaves which are annual in Europe, but perennial between the tropics, are large, nearly a span in length, scabrous, and irregularly divided into three or five lobes: of a deep green colour on the upper surface, with a pale green longitudinal vein to each lobe; but on the under surface the whole is pale green, with the veins raised, reticulated, and downy: they are supported on round petioles. The fruit in its early stage serves as a common receptacle, and contains upon its inner surface both the male and female florets. It is turbinate, umbilicate at the top, in colour varied green and red, fleshy, soft, and hollow within.[3]

The fig tree was very much cultivated by the ancients, who brought the fruit to perfection by a process which they termed caprification. They had observed that those figs which were perforated by an insect, the Cynips Psenes of Linnæus, always ripened better; and therefore they tied a wild fig, on which this insect breeds, near the young cultivated figs, so as to cause the insects, when they issued from the wild fig, also to perforate them. The good effects arose from the crawling of the larvæ within the figs, scattering the pollen, and thus forwarding the impregnation of the female florets. Thus the gardeners of Aleppo, ignorant of the cause of the benefit derived from the Cynips, imitate the process by pricking the figs with a needle dipped in oil, in order to procure early figs. The fruit when ripe is dried in ovens, to preserve it, and to destroy any of the larvæ of the Cynips that may remain;

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[1] Συκη of the Greeks, who termed the fruit Συκα.

[2] The first fig-trees introduced into England are still in the Archbishop's garden at Lambeth. They are supposed to have been planted by Cardinal Pole, and now bear excellent fruit. In the neighbourhood of Worthing, and some other places, figs are ripened in the open air, on standard trees.

[3] *Gærtner de Fructibus,* ii. 66. t. 91.

and then packed very closely in the small chests in which they are imported into this country.[1]

Qualities.—Dried figs have a sweet, peculiar taste. They are generally compressed: the cuticle is of a brownish colour, and crusted over with crystals of sugar; and within are numerous small yellow lenticular seeds, in a sweet viscid pulp. They consist almost entirely of mucilage and sugar.

Medical properties and uses.—The dietetical use of figs is well known.[2] When eaten freely, they are apt to occasion flatulent colic and diarrhœa. They are used medicinally, in demulcent decoctions, in pulmonary and other inflammatory complaints; and two ounces of them boiled in six fluid ounces of water, and strained, form a useful gargle in cynanche tonsillaris, when suppuration takes place. The figs themselves, roasted or boiled and split, form excellent cataplasms, when applied very hot to gum-boils, buboes, and other phlegmons.[3]

Officinal preparations. — *Decoctum Hordei compositum,* L. D. *Confectio Sennæ,* L. D. *Electuarium Sennæ compositum,* E.

FŒNICULUM. *De Candolle's Prodromus,* pars. iv. p. 142.

Cl. 5. *Ord.* 2. Pentandria Digynia. *L.* *Nat. ord.* Umbelliferæ.
Species 1. F. *vulgare.* Common Fennel. *Pharm. Lond.*
2. *Dulce.* Sweet Fennel.

Officinal. FŒNICULUM, *Lond.* FŒNICULI SEMINA, *Edin.* ANETHUM FŒNICULUM, SEMINA, *Dub.* The seed and root of Sweet Fennel.

Syn. Fenouil ou Anis douce (*F.*), Fencheesamen (*G.*), Venkel (*Dutch*), Fennikel (*Dan.*), Fänkol (*Swed.*), Kopo Wlosky (*Pol.*), Eneldo hinojo (*S.*), Finocchio (*I.*), Hinojo (*S.*), Funcho (*Port.*), Razecanuj (*Arab.*), Badeeyan (*Pers.*), Perumsiragam (*Tam.*), Mayuri (*Hind.*), Adas (*Javanese*).

Common Fennel is a biennial plant, originally found in the south of Europe only, but now growing abundantly on our chalky soils and cliffs, and flowering in July and August. The root is fusiform, elevating a stem about four feet in height, erect, branching, leafy, striated, and smooth. The leaves are alternate, tripinnate, composed of long, smooth, depending, capillary leaflets, of a very deep green colour. The flowers are in large, terminal, rayed, flat umbels: the petals five, ovate, emarginate, with their points turned inward, and of a yellow colour: the filaments shorter than the petals,

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[1] The most luscious dried figs in the world are those of Kalamata in the Morea. They are dried upon rushes, with which the figs are pierced.

[2] Figs were the chief part of the food of the ancient Athletæ.

[3] The most ancient cataplasm on record was made of figs. It was used for the relief of Hezekiah, who lived 260 years before Hippocrates. "And Isaiah said, Take a lump of figs. And they took and laid it on the boil, and he recovered."—2 Kings, chap. xx. 7.

spreading, also yellow, and bearing double anthers. The germen is similar to that of *dill:* the seed ovate, very little compressed, of a brownish olive colour when ripe, three-ribbed, and encircled with a membranous margin.

There are two species of fennel officinal; the root of the *common fennel*, and the seed of the second, the *sweet fennel*, although this is not named in the present London Pharmacopœia. The roots found in the shops are the produce of our own country, and are taken up in the spring, but the seeds are generally imported from Italy.

Qualities.—The roots are covered with a brown bark, are woody and white within, have scarcely any odour, and only a slightly sweetish taste, with very little aromatic warmth; but the *seeds* have a fragrant odour, and a sweet, warm, aromatic taste. These qualities depend on a volatile oil, which is dissipated by decoction in water, and separated by distillation; they are completely imparted to alcohol, but only imperfectly to boiling water by infusion. The seeds contain also a fixed, inodorous, insipid oil.

Medical properties and uses.—Fennel was formerly esteemed as a remedy; and supposed to be resolvent, diuretic, carminative, and stomachic; but even as a carminative it is not superior to anise-seed and caraway; and it is therefore now seldom employed. The dose of the bruised seed may be from ℈j. to ʒj.

Officinal preparations.—*Aqua Fœniculi*, L. D. *Oleum Seminum Fœniculi dulcis*, D. *Spiritus Juniperi comp.*, L. D. *Confectio Piperis nigri*, L. D. *Decoctum Chamœmeli compositum*, D.

FRAXINUS. *Spec. Plant. Willd.* iv. 1102.

Cl. 23. *Ord.* 2. Polygamia Diœcia. *Nat. ord.* Oleaceæ.

G. 1903. Hermaph. *Calyx* 0, or four-parted. *Corolla* 0, or four-parted. *Stamens* two. *Pistil* one. *Capsule* one-seeded, lanceolate. Female. *Pistil* one, lanceolate.

Species 15. F. *Ornus*[1] (Ornus *Europea*). Flowering Ash. *Med. Bot. 3d. edit.* p. 589. *Sibthorp, Flora Græca, t.* 4.

Officinal. MANNA, *Lond. Dub. Edin.* Manna.

Syn. Manne (*F.*), Mannaesche (*G.*), Manna (*Russian*), Manna (*I.*), Mana (*S.*), Turenjeebeen (*Arab.*), Shirkhisht (*H.*), Disu Bacdak (*Turkish*).

This tree is a native of the south of Europe, growing abundantly in Calabria, Apulia, Sicily, on Mount Parnassus, and the loftier mountains of Greece; and is cultivated in England as an ornamental tree; flowering in May and June. It seldom exceeds twenty feet in height, is very branching, and has a smooth grey bark. The leaves are deciduous, petiolate, opposite, and pinnate; composed of two or three pairs

1 Μελια Dioscoridis.

of leaflets, with a terminal one: the leaflets are one inch and a half long and three fourths of an inch broad, acuminate, serrated, smooth, and of a deep bright green colour. The footstalks vary in length, and are channelled with stipules; the gems are villous. The flowers grow in close panicles, and at the extremities of the young shoots. They are pedicellated, opposite, and corollated. The segments of the calyx are ovate, pointed, and nearly equal: the petals oblong and linear, obtuse, entire, attenuated at the base, spreading, twice the length of the calyx, and of a white colour. The filaments are two, spreading, white, smooth, and bearing yellow incumbent anthers. The germen is small, oval, and smooth, with a short straight style, crowned with a notched stigma. The capsules droop, are lanceolate, notched, compressed, and bilocular at the base; with one cell generally abortive, while the other contains a cylindrical ferruginous seed.

Two other species of ash, the *rotundifolia*, *excelsior*, and *parviflora* also produce manna.[1] It exudes in warm dry weather spontaneously from the stem and branches; and concretes into whitish tears, which are scraped off and sold under the name of manna in the tear. The greater part of the manna, however, is obtained by longitudinal incisions about three inches in length, made on one side of the tree only in the same season, and continued from the base of the trunk upwards as far as the branches, at the distance of an inch from each other. The manna flows at first in the form of a thick juice, which gradually concretes: it is collected in baskets and known under the name of *flake* manna. By making the juice to concrete on straws and chips fastened near the incisions, a finer kind of manna is procured, which is called canulated manna, *manna in cannoli*. In Sicily this variety is received on the leaves of the prickly pear, *Cactus Opuntia*. The collecting begins about the middle of June, and terminates in September.[2] A third kind called fat manna, *manna grassa*, flows from the tree in October and

[1] A substance resembling manna is also produced from the Tamarisk, and used as food by the Bedouin Arabs in the region of Mount Sinai: but Mitscherlich asserts that it contains no mannite. Burckhardt says, "Whenever the rains have been plentiful during winter, it drops abundantly. They gather it before sunrise, because if left in the sun it melts: they use it as we do sugar, principally in their dishes composed of flour."—*Travels in Nubia*, 4to. 1819. Introd. p. lxviii. Dr. Royle informs us that there are four kinds of manna known in India.:—1. called *Sheerkhist*, procured in Khorasan; 2. *Torunjbeen*, the production of Alhagi, *Maurarum* of De Candolle; 3. *Guzunjben*, from a tamarisk; 4. *Shukhrcol-askur* from Calotropis *procera;* and 5. from an umbelliferous plant.

[2] Arctuarius is the first Greek who notices manna.—*Friend's Hist. of Med.* i. 271.

November, and owing to the rains runs to the ground, and contains many impurities.

Manna is brought to Great Britain packed in chests. The different sorts are in separate packages, and are known by the names of Flake manna, Sicilian manna[1], and Calabrian manna. The best is "in oblong pieces or flakes, moderately dry, friable, light, of a whitish or pale yellow colour, and in some degree transparent: the inferior kinds are moist, unctuous, and brown."[2] The best flake manna bears the impression of the branch on which it had concreted on its inner surface. Manna is said to be occasionally counterfeited by a composition of honey or sugar, mixed with scammony or some other purgative[3]: but such frauds are now seldom attempted; and bad or counterfeit manna may be easily discovered by its colour, weight, transparency, and taste, which are different from those of real manna.

Qualities.—Manna has a slight peculiar odour, and a sweet taste, with some degree of bitterness, leaving a slight nauseous impression on the palate. The finer pieces, which are often hollow, when broken and examined by the microscope exhibit bundles of long beautiful spicular crystals; but the general texture of the pieces is granular. It is entirely soluble in water and alcohol: and the latter, when the solution has been assisted by heat, deposits on cooling five eighths of a beautifully white inodorous crystallized matter, which was formerly regarded as pure manna, but which is now ascertained to be a peculiar saccharine principle; it has been named *Mannite;* whilst an uncrystallizable mucilaginous extract remains, on which probably the purgative quality of the drug depends. Fourcroy and Vauquelin suppose that the common manna of the shops contains four different ingredients:—1. Pure manna, constituting three fourths of the whole; 2. A little common sugar; 3. A yellow nauseous smelling substance, to which its purgative qualities seem owing: and, 4. Mucilage. But it is to Proust, Thénard, and Bouillon La Grange, that we are indebted for a knowledge of the chymical composition of manna. According to Thénard's analysis, it consists of mannite, a small proportion of pure sugar, and the nauseous uncrystallizable mucus, on which the active virtues of the drug depend.[4] The Mannite differs from sugar, in being incapable of undergoing the vinous fermentation.

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[1] The greatest produce of Sicilian manna is in the neighbourhood of Castellamare, Carini, Cefalu, and Caronia, where it yields an annual revenue of 40,000*l.* sterling.—*Smyth's Sicily and its Islands,* 4to. 1824, p. 14.

[2] *Lewis.*

[3] *Alston's Mat. Med.* ii. 472.

[4] *Ann. de Chim.* t. lix. p. 51.

Medical properties and uses.—Manna is a very gentle laxative. It was extravagantly commended by some of the older physicians; but is now more justly regarded as a laxative fit for children only, and persons of very weak habits. When given in a dose sufficient for an adult, it is apt to occasion flatulence and griping; and therefore it is seldom used, except as an adjunct to senna, rhubarb, or solutions of neutral salts, with the view of covering their tastes.

The dose for children is from ʒj. to ʒiv.; and for adults from ℥j. to ℥ij.

Officinal preparations.—*Confectio Sennæ*, L.E.D. *Enema Catharticum*, D. *Enema fœtidum*, D. *Syrupus Sennæ*, D.

GALBANUM. *Don, Trans. of Linnean Soc.* vol. x.
Nat. ord. Umbelliferæ.
Species. G. *officinale.*
Officinal. GALBANUM, *Lond.* BUBONIS GALBANI GUMMI RESINI, *Edin. Dub.* Galbanum Gum-resin.

Syn. Galbanum (*F. & Dutch*), Mutterharz (*G.*), Galbano (*I.*), Galbáne (*S.*), Bārzud (*A.*), Bireejā (*H.*), Beeznd (*Pers.*).

Mr. Don has lately advanced sufficient reasons for thinking that galbanum is the production of a plant allied to the genus Siler. He proposes to call it Galbanum *officinale:* it is a native of Persia, and belongs to the natural order Umbelliferæ.

The gum-resin is brought to this country from the Levant, in cases or chests, containing from one to three hundred weight each. The best is in ductile masses, composed of distinct whitish tears agglutinated together by a pale brown or yellowish substance. It is generally much mixed with stalks, seeds, and other impurities. The separate tears are considered to be the best part of the mass. When the colour is dark brown or blackish, it must be rejected as bad.

Qualities.—Galbanum has a strong peculiar odour, slightly resembling that of turpentine; and a bitterish, warm, acrid taste. Its specific gravity is 1·212.[1] When triturated with water, about one fourth of its weight is dissolved, forming a milky solution; but after standing for a little time, four parts are again deposited, and what remains undissolved by the trituration is, exclusive of the impurities, almost completely soluble in alcohol. Wine and vinegar act on it nearly in the same manner as water. Alcohol takes up one fifth of its weight; and a yellow tincture is produced, which has the sensible qualities of the galbanum, and becomes milky on the addition

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1 *Brisson.*

of water; but there is no precipitate. Proof spirit acts slowly on it, and dissolves the whole, the impurities excepted. Sulphuric ether dissolves a considerable portion of galbanum, forming a bright golden-coloured tincture, which, when evaporated alone, or floating on the surface of water, leaves a yellow, tenacious resin, that retains in perfection the sensible qualities of the galbanum. The part insoluble in ether is nearly wholly soluble in water. Chlorine, added to the solutions of galbanum, throws down an insoluble matter which appears to be extractive. By distillation the gum-resin "yields half its weight of volatile oil, which has at first a blue colour."[1] From our experiments, galbanum appears to consist of resin, volatile oil, gum, and extractive.

Medical properties and uses.—Galbanum is stimulant, antispasmodic, expectorant, and deobstruent; and may be placed between ammoniacum and assafœtida. It has been found useful in hysteria, particularly when attendant on difficult menstruation; in chlorosis, humoral asthma, and chronic rheumatism. Externally it is applied as a resolvent and a stimulating suppurative to indolent tumours.

The dose is from grs. x. to ʒss. in pills; or triturated with water and gum-arabic so as to form an emulsion.

Officinal preparations.—*Pilulæ Galbani comp.* L. D. *Pilulæ Assafœtidæ comp.* E. *Tinctura Galbani,* D. *Emplastrum Galbani,* L. D. *Emplastrum Assafœtidæ,* E. *Emplastrum gummosum,* E.

GALIPEA. *Plantæ Equinoctiales,* tom. ii. p. 5.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Diosmeæ.

Gen. Char. *Calyx* monophyllous, campanulate, five-toothed. *Corolla* five petals cohering near the base, funnel-shaped.

Spec. 1. G. *Cusparia.* Three-leaved Bonplandia. *De Candolle, Humboldt,* l. c. tab. 97. *Mém. de l'Institut,* 184. Part I. p. 82. pl. 10.

Officinal. CUSPARIA, *Lond.* BONPLANDIÆ TRIFOLIATÆ CORTEX, *Edin.* CORTEX ANGUSTURA, *Dub.* Cusparia bark, Bonplandia bark, or Angustura bark.

Syn. Angusture (*F.*), Angusturarinde (*G.*), Angustura (*I.*).

There is reason to believe that M. Saint Hilaire is correct in regarding the tree which yields the Cusparia bark as a Galipea. The London College has adopted the specific name *Cusparia.*

This tree is a native of South America, growing abundantly in the woods five or six leagues from the eastern bank of the Carony, at the foot of the hills that surround the missions of Capassui, Upata, and Alta Græcia. It grows also west of Cumana, in the Gulf of Santa Fé; and, as Hum-

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[1] *Thomson's Chymistry,* 4th edit. v. 142.

boldt remarks, may become an article of export from New Andalusia. It is an elegant evergreen, rising to the height of from sixty to eighty feet, having a cylindrical *trunk*, covered with a grey-coloured bark, and branching towards the summit. The branches are alternate, the upper ones spreading nearly horizontally. The *leaves*, which are ranged alternately on the branches, are about two feet long, independent of the petiole, and composed of three elegant oblong ovate leaflets, pointed at each extremity, and attached at their bases to a single channelled petiole, from ten to twelve inches in length. The *leaflets* are glandular, and, when fresh, exhale an agreeable aromatic odour. The *inflorescence* is a terminal raceme, composed of alternate peduncles, bearing from three to six flowers each: the calyx is inferior, persistent, five-toothed, and tomentose: the corolla is funnel-shaped, and composed of five petals, so united below as to appear as one tube, with a five-cleft spreading tube. The *nectary* consists of fine glandular bodies. The *stamens*, which are shorter than the petals, have white filaments supporting oblong yellow anthers; the *pistil* is formed of five oval hairy ovaries, from the centre of which a single style rises, supporting five fleshy green stigmata. The *fruit* consists of five oval bivalve capsules, each enclosing a single seed. According to Dr. Hancock the height of the tree seldom exceeds twenty feet; indeed, the appearance of the bark indicates a small tree. The first parcels of Cusparia bark were imported from Dominica in 1778, and the tree yielding it was supposed to be a native of Africa[1]; but importations from Cadiz and the Havannah, and the travels of Humboldt and Bonpland, have led to the knowledge of the real place of its growth. It is brought to this country packed in casks; but the original package, as Mr. Brande, senior, who first wrote on the subject, informs us, is curiously made of the large leaves of a species of palm, surrounded by a kind of network of sticks. The bark is in pieces of different lengths, some nearly flat, and others in partial quills of all sizes intermixed.

Qualities.—The odour of this bark is not strong, but peculiar; the taste is bitter, slightly aromatic and permanent, leaving a sense of heat and pungency in the throat. The pieces are covered with a whitish, wrinkled, thin epidermis: the inner surface is smooth, of a brownish-yellow colour, and the intermediate substance mottled-fawn colour, and of a compact texture. It breaks with a close, short, resinous frac-

[1] See *Brande's Experiments and Observations on the Angustura Bark*, a name which it received only because it came from *Nueva Guayana*, or *Angustura*.

ture, is easily pulverized, and affords a powder which, when triturated with lime or calcined magnesia, gives a smell of ammonia. The active matter is taken up by cold and hot water in infusion, and is not injured even by coction, but the addition of alcohol precipitates part of the extractive. The alcoholic tincture reddens litmus paper, and becomes milky on the addition of water. The watery infusion precipitates the infusion of galls, and of yellow cinchona, but not gelatine.[1] I found that it precipitates sulphate of iron, tartarized antimony, diacetate and acetate of lead, bichloride of mercury, and pure potassa, yellow; which confirms Vauquelin's analysis. Nitrate of silver also precipitates it yellow, but assumes a violet colour after some time. Sulphate and ammoniated sulphate of copper precipitate it green, owing to the presence of the igasauric acid. Ammonia deepens the colour, but is not precipitated. Sulphuric acid gives the infusion a brown colour, and gradually a lemon-yellow precipitate is deposited; whilst nitric acid deepens the colour to a blood red, and after some time affords a lemon-yellow precipitate. The muriatic acid does not affect it. Sulphuric ether takes up one part from ten of the powder, and when evaporated on water, leaves a greenish yellow very acrid resin, and renders the water milky: the addition of nitro-muriatic acid changes this milky appearance to red, slowly producing a lemon-yellow coloured precipitate, and giving the resin on the side of the glass a brownish-pink colour. By distillation with water, the bark yields a small portion of a white essential oil. These experiments ascertain the substances which are incompatible in prescriptions with infusion or tincture of cusparia bark; and show that it contains *resin*, a peculiar variety of *extractive*, *carbonate of ammonia*, *volatile oil*, and *igasauric acid*, which I was inclined to think was in combination with *cinchonia*[2]: but Saladin has investigated the subject, and asserts that it is a new alkali, which he has termed

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[1] Vauquelin. *Annales de Chimie*, lix. 130.

[2] A species of bark, in some respects resembling the Cusparia, has lately been introduced upon the Continent, possessing the most deleterious quality. Plamba has examined it, and named it Angustura *ferruginea*. It is readily distinguished from the true bark, by its greater thickness and weight, and the epidermis being of a brownish olive hue, and warty, and devoid of the lichen named *Myriotrema*. It impresses also the most nauseous and permanent bitter when chewed. By agitating the powder in very dilute muriatic acid, and then testing with ferrocyanate of potassa, the infusion assumes a beautiful green, changing to blue, owing to the iron contained in the cuticle of this bark. The narcotic deleterious matter has been ascertained to be an alkali, which has been named *Brucia*. For particulars regarding its poisonous properties, vide *Orfila's Traité des Poisons*, tom. ii. p. 331, and *The Lond. Med. Repository*; and for the characters of Brucia, vide *Ann. de Chim. et Phys.* xii. 113.

Cusparin. It is readily procured by acting upon the infusion of Cusparia bark with absolute alcohol, and leaving it to spontaneous evaporation. The crystals procured are four-sided, melt at a low temperature, and lose 3·09 per cent. of weight. Water at 60° dissolves only ½ per cent., at 212° 1 per cent. They dissolve in acids and in alkalies, and are precipitated by infusion of galls.[1]

Medical properties and uses.—Cusparia bark is stimulant and tonic. It was introduced in the West Indies with very high pretensions; and, although it is not superior or even equal to cinchona bark in intermittent fevers, yet it is a remedy possessed of very considerable powers. It does not oppress the stomach, but gives to it a degree of warmth, expels flatus, keeps the bowels open, and increases the appetite for food. It is particularly efficacious in bilious diarrhœa and dysentery, after due evacuations; and also proves useful in dyspepsia, hysteria, leucorrhœa, and most of the diseases in which the use of a general tonic is indicated. Mr. Brande, senior, published several cases which came under his own observation, and some from the communications of others, in which its usefulness, as a remedy for intermittents, appears to be confirmed; but this is disputed, particularly by Alibert, who gave it a fair trial in the hospital of St. Louis. My own experience does not enable me to give an opinion on the subject. Its employment is contra-indicated in directly inflammatory complaints, in hectic fever, and colliquative diarrhœa.

It may be exhibited in substance, in watery infusion, in tincture, and in the form of watery extract. The powdered bark is given in doses of from grs. v. to ʒj., beyond which it is apt to induce nausea. It may be combined with rhubarb, neutral salts, magnesia, and testaceous medicines; or with powdered cinnamon, which covers its nauseous taste better than any other adjunct. Of the aqueous extract, grs. x. is a full dose. In large doses all the forms are apt to excite nausea.

Officinal preparations.—*Infusum Cuspariæ*, L. *Infusum Angusturæ*, D. *Tinctura Bonplandiæ trifoliatæ*, E. *Tinctura Angusturæ*, D.

GALLÆ. Vide *Quercus.*

GENTIANA.[2] *Spec. Plant. Willd.* i. 1331.

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[1] Jahresbericht, 1835.

[2] Γεντιανη Dioscoridis. Said to have been named after Gentius, king of Illyria, who first discovered its medicinal properties 167 years before the birth of our Saviour. Many other species of gentian as well as the G. *lutea* possess the same medicinal properties; namely, G. *biloba*, G. *punctata*, G. *Macrophylla*, and G. *Catesbaei*. The G. *Chirayita* is now much used as a stomachic bitter in this country.

Cl. 5. *Ord.* 2. Pentándria Digynia. *Nat. ord.* Gentiáneæ.
G. 512. *Corolla* one-petalled. *Capsule* two-valved, one-celled; with two longitudinal receptacles.
* *Corollas five or nine cleft, somewhat bell-shaped.*
Species 1. G. *lutea.* Yellow Gentian. *Med. Bot.* 3*d. edit.* 273. *t.* 95.
Officinal. GENTIANÆ RADIX, *Lond.* GENTIANÆ LUTEÆ RADIX, *Edin. Dub.* Gentian root.

Syn. Gentiane jaune (*F.*), Gelber Enzian (*G.*), Gentiaan (*Dutch*), Entzianrod (*Dan.*), Baggsöta (*Swed.*), Genziana (*I.*), Jenciana (*S.*), Genciana Amarella (*Port.*).

This species of gentian is a perennial plant, found growing on the Alps of Switzerland and Austria, the Apennines, the Pyrenees, and in North America. The root is thick, long, and cylindrical. The lower leaves are petiolate, large, spear-shaped, stiff, and having five large veins on the back, plaited, and of a yellowish green colour; those of the stem are concave, smooth, and egg-shaped, sessile, and almost embracing the stem, which rises three or four feet in height. The flowers are in whorls at the upper joints, large, yellow, peduncled, and beautiful: the calyx, which is a membranous deciduous spathe, bursts on the side when the flower opens: the corolla is rotated, divided into five or eight narrow spreading segments, elliptical, and speckled with many thick dots. The filaments are shorter than the corolla, and furnished with long erect anthers: the germen is conical, crowned with two sessile reflected stigmas; and becomes a conical capsule, which contains numerous small seeds.

Gentian roots are brought to this country from Germany. They are in pieces of various lengths and thickness, twisted, wrinkled on the outside, and covered with a brownish or dull orange-coloured cuticle.

Qualities.—They have no particular odour, and the taste is intensely bitter without being nauseous. When cut transversely, the pieces exhibit a yellow maculated heart, with thick bark verging to brown. The sensible qualities of gentian root are extracted by ether, alcohol, and water. The two former extract a resin and a bitter extractive matter; and the latter, some part of these and a considerable quantity of mucilage also, which occasions the infusion often to become ropy. Diluted alcohol is its proper menstruum. In the bitter extractive the virtues of the drug seem to reside. According to the analysis of MM. Henry, senior, and Caventou, Gentian contains an odorous, very fleeting principle; a yellow bitter principle, which they named *gentianin*; a substance resembling birdlime; a greenish oily matter; a free organic acid; a saccharine principle; gum; a tawny colouring matter; and woody fible.[1] The Gentianin is supposed to be the active principle of the plant: it is a yellow, inodorous, crystallizable substance, with the bitterness of the Gentian, scarcely soluble in cold water, but very soluble in alcohol and ether.[2]

Medical properties and uses.—Gentian-root is tonic, stomachic, and in large doses aperient. Its use as a stomachic bitter is of a very ancient date; and it is still, perhaps, the most generally employed of this class of medicines. It has been found beneficial in dyspepsia, gout, hysteria, and jaundice, chlorosis, dropsy, and diarrhœa; and in all cases of general debility in which tonics are indicated. It is sometimes joined with the cinchona in intermittents; and, according as the circumstances of the cases for which it is prescribed direct, it may be combined with orange-peel, chalybeates, aromatics, squill, mineral acids, and neutral salts. On account of its antiseptic effects on dead animal matter, its infusion has been used as an application to putrid ulcers. The forms in which it is generally given are infusion and tincture.

The dose in substance is from grs. x. to ℈ij.

Officinal preparations.—*Extractum Gentianæ*, L.E.D. *Infusum Gentianæ compositum*, L. E. D. *Tinctura Gentianæ composita*, L. E. D. *Vinum Gentianæ compositum*, E.[3]

GEOFFRŒYA. *Spec. Plant. Willd.* iii. 1129.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.
G. 1362. *Calyx* five-parted. *Drupe* ovate. *Nucleus* compressed.
Species 3. G. *inermis.* The Cabbage-tree. *Med. Bot. 3d edit.* 416. *t.* 151. *Phil. Trans.* lxvii. 512. *t.* 10.
Officinal. GEOFFRŒYÆ INERMIS CORTEX, *Edin.* GEOFFRŒA INERMIS; CORTEX, *Dub.* Cabbage-tree bark.

Syn. Umari de la Jamaique (*F.*), Geoffrunrinde (*G.*), Maskbark (*Swed.*), Geoffrea (*I.*).

This tree is a native of Jamaica, growing in the low savannahs. It is a lofty tree, branching towards the top; and covered with a smooth grey bark. The leaves are pinnate, composed of four or five pairs of lancet-shaped, pointed, smooth leaflets, in pairs on short footstalks, with a terminal

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[1] *Journ. de Physique*, vol. lxxxiv. p. 245.

[2] To obtain gentianin, macerate the root in ether, decant and evaporate the tincture, treat the residue with alcohol, and evaporate the alcoholic solution; then treat the residue with diluted alcohol, and leave the filtered solution to crystallize. To obtain it quite pure, boil the impure crystals in water with calcined magnesia, and submit the mass to the action of ether; the etherial solution gives crystals of pure gentianin.

[3] Dr. Paris (*Pharmacologia*) says, that the quack medicine known under the name of *Brodum's Nervous Cordial* consists of the tinctures of *gentian*, *colomba*, *cardamom*, and *bark*, with the compound spirit of *lavender* and *wine of iron*; and *Stoughton's Elixir*, of tincture of *gentian*, with the addition of *serpentaria*, *orange-peel*, *cardamoms*, and some other aromatics.

one. The flowers are in clusters on large branched spikes. The calyx is bell-shaped, with five short obtuse teeth; the corolla papilionaceous, of a pale rose-colour, consisting of a roundish concave *vexillum* notched at the apex; two oblong, obtuse, concave, somewhat shorter *alæ;* and an obtuse divided *carina.* The filaments, nine of which are united at the base, support simple roundish anthers: the germen is oval, with a curved tapering style, and hooked stigma. The fruit resembles a small plum, is pulpy, marked on each side with a longitudinal furrow; and contains a hard seed.

Qualities.—Cabbage-tree bark has a disagreeable, sweetish, mucilaginous taste. The pieces, as they are brought to this country, are externally grey; internally black, furrowed, and pulverulent, affording a powder resembling that of jalap. Its soluble components seem to be chiefly mucus, resin, extractive, saccharine matter, and a narcotic principle.

Medical properties and uses.—This bark is a powerful anthelmintic. Its properties, as such, were first noticed by Mr. Peter Duguid[1], and have since been fully confirmed: but we are principally indebted to Dr. Wright for an accurate knowledge both of the plant and its virtues.[2] It is particularly useful in expelling lumbrici, and may be given in forms of powder, decoction, extract, and syrup; but the decoction is the form most commonly employed. (See *Preparations and Compositions.*) It operates as a cathartic, but has a narcotic effect also; and requires, therefore, to be given at first in small doses, "which may be gradually increased till nausea is excited, when the dose for that patient is ascertained."[3] In over-doses, it is apt to occasion sickness, vomiting, fever, and delirium; and the same effects are produced if cold water be drunk during its operation. When such symptoms occur from either cause, they are generally removed by copious draughts of warm water, a dose of castor oil, and plentiful dilution with lemonade or infusion of tamarinds. Owing to these deleterious effects of the remedy, it has not been generally used in this country.

The dose of the powder is from ℈j, to ʒss.;—and that of the extract, which is made by evaporating the decoction, grs. iij. The syrup, which is the decoction with a double portion of sugar added to it, may be taken in doses of from two to four spoonsful.

Officinal preparation.—*Decoctum Geoffrœyæ inermis,* E.

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[1] *Physical and Literary Essays,* ii. 264.
[2] *Phil. Trans.* l. c. [3] *Wright,* l. c.

GLYCYRRHIZA.[1] *Spec. Plant. Willd.* iii. 1143.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.

G. 1366. *Calyx* bilabiate; upper lip three-cleft, lower undivided. *Legume* ovate, compressed.

Spec. 4. G. *glabra.* Common Liquorice. *Med. Bot. 3d edit.* 429. *t.* 152.

Officinal. GLYCYRRHIZA, *Lond.* GLYCYRRHIZÆ RADIX RECENS, *Dub.* GLYCYRRHIZÆ GLABRÆ RADIX:—EXTRACTUM, *Edin.* Liquorice root, and the extract.

Syn. Réglisse (*F.*), Sussholzwurzel (*G.*), Zoethout (*Dutch*), Lakris (*Dan.*), Lakrits (*Swed.*), Lakrycya (*Pol.*), Addimodrum (*Tam.*), Bikh-mehek (*Pers.*), Urat manis (*Malay*), Oyot manis (*Jav.*), Kanzoo (*Japanese*), Olinde (*Cyng.*), Legorizia (*I.*), Regaliza (*S.*), Alcacuz (*Port.*), Ussulussoos (*Arab.*), Iét'himad'h (*H.*), Yástimadhuca (*San.*).

The liquorice plant is a native of the south of Europe and Syria. In Languedoc, Spain, and Sicily, it grows in such abundance as to prove the scourge of the cultivator. The greater part of what is used in Britain is the produce of its own soil by cultivation. The London market is supplied chiefly from Mitcham in Surrey.[2] It flowers in August. The root is perennial, running, when in its proper soil, a light sandy one, very deep; it is round; the thickness from that of a goose-quill to that of the thumb; long, thin, flexible; furnished with sparse fibres; covered with a brownish cuticle; internally fibrous, of a pale yellow colour, and juicy. The stem rises four or five feet in height, is herbaceous and striated, with few branches. The leaves are alternate and pinnated, consisting of four or five pairs of ovate, retuse, petiolated leaflets, with a terminal one; of a pale green colour, and clammy on the under side. The flowers are papilionaceous, in long axillary sparse spikes, of a blue or purplish colour. The calyx is persistent, tubular, and divided above: the corolla consists of an ovate, lanceolate, obtuse, erect, concave *vexillum;* two oblong, obtuse *alæ*, and a shorter *carina.* The filaments are ten, nine of them united at the base, bearing simple roundish anthers: the germen is short, with a tapering style and blunt stigma. The legumes are ovate, flatted, smooth, acute, one-celled, containing two or three small kidney-shaped seeds.

When liquorice root is three years old, it is dug up for use in November. "The whole roots are then washed, the fibres cut off, and the smaller roots separated from the larger ones:

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[1] Γλυκυῤῥίζα Dioscoridis. The name is derived from γλυκὺς sweet, and ῥίζα, a root.

[2] Very little is now grown at Godalming, where it was formerly cultivated to some extent.—Vide *Stevenson's Survey of Surrey,* p. 380. It was first cultivated in England in 1558.—*Stow.*

the former, termed the offal are dried and ground to powder; the latter are packed up and sold to the druggists."[1]

Qualities.—This root is inodorous, and the taste sweet and mucilaginous, leaving, when it is chewed without being peeled, a slight degree of bitterness in the mouth. The powder, if good, is of a brownish yellow colour, and has a rich sweet taste, more agreeable than that of the fresh root; but it is said to be often sophisticated with flour, and other substances not quite so wholesome, in which case it has a fine pale yellow colour.

The medical properties of the root depend on a saccharine matter, which approaches in its nature to *sarcocoll* and mucus: water, by coction, extracts both of these principles, but alcohol only the saccharine matter. For the properties of the extract, which is imported from Spain, see Part III. (*Preparations and Compounds.*) According to Robiquet, it contains fecula, saccharine matter, *Glycion*[2], *Asparagin*[3], a resinous oil, phosphate and malates of lime and magnesia.

Medical properties and uses.—Liquorice root is a pleasant demulcent; but on account of its bulk it is rarely used in substance.[4] The decoction of it, either alone or in combination with other mucilaginous vegetables, is often given in catarrh, and in hectic and phthisical cases. It is also administered in some cases of dyspepsia, where there is a deficiency of the natural mucus of the stomach, which is injured by the acrimony of ill-digested food, and a morbid state of its secreted fluids. The dose of the powder is from gr. x. to ʒj., that of the decoction a cupful frequently repeated.

Officinal preparations.—*Extractum Glycyrrhizæ*, L. E. D. *Decoctum Sarsaparillæ comp.* L.D. *Infusum Lini*, L. *Confectio Sennæ*, L. E. *Decoctum Mezerii comp.*, E. D.

GRANATI CORTEX. Vide *Punica.*

GRATIOLA.[5] *Spec. Plant. Willd.* i. 102.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. ord.* Scrophularineæ.

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[1] The price of the best roots is about 3*l.* per cwt.—*Stevenson*, l. c.

[2] To procure glycion, precipitate infusion of liquorice root with sulphuric acid, wash the precipitate, dissolve in alcohol, and neutralize with carbonate of potassa in fine powder: let the sulphate of potassa separate by rest, and evaporate the solution to dryness. Pure glycion is a yellow transparent mass, sweet, soluble in water and alcohol, and combustible. It unites with alkalies; but is precipitated from its solution by all the alkalies.

[3] When Robiquet obtained Asparagin from liquorice root, he thought it different from true Asparagin, and named it *Agedoite:* it is a crystalline substance.

[4] The ancients believed that chewing the root allayed thirst: but this opinion was founded on a mistake.—*Cullen, Mat. Med.* ii. p. 407.

[5] The name means *Gratia Dei*, from the supposed virtues of the plant.

G. 49. *Corolla* irregular, reversed. *Stamens* two, sterile. *Capsule* two-celled. *Calyx* seven-leaved; the two exterior leaves spreading.

Species 1. G. *officinalis.* Hedge Hyssop. *Med. Bot. 3d edit.* 359. *t.* 131. *Flora Danica, t.* 363.

Officinal. GRATIOLÆ OFFICINALIS HERBA, *Edin.* The herbaceous part of Hedge Hyssop.

Syn. Gratiole (*F.*), Gradenkraut (*G.*), Genadekruid (*Dutch*), Gudsnaadesurt (*Dan.*), Jordgalla (*Swed.*), Kenjtrud (*Pol.*), Graziola (*I.*), Graciola (*S. Port.*).

This plant is a perennial, a native of the south of Europe, growing in marshy or moist pastures, and flowering in June and July. It is cultivated in Britain.[1] The root is creeping, cylindrical, fleshy, and fibrous; and sends up several upright, smooth, round stems, nearly a foot in height, with sessile leaves, in some degree sheathing, and opposite in pairs. They are lanceolate, smooth, serrated towards the point, of a bright somewhat deep green colour; nearly two inches long, and half an inch broad; punctured, and longitudinally veined beneath. The flowers are axillary and solitary, on slender reddish peduncles: the calyx is divided into five elliptical segments, with two lanceolate, spreading, bracteal leaves: the corolla is tubular, divided at the lip into four obtuse segments, the uppermost of which is much broader than the other three, and more reflected; the tube is yellowish, intermixed with reddish streaks; the limb pale purple. Two of the filaments only are furnished with anthers; and the style is tapering, erect, with a divided stigma. The capsule is oval, and contains many small seeds.

The sensible qualities of Gratiola are strongest when it is in flower; at which time, therefore, it should be gathered for use.

Qualities.—It has scarcely any odour; but the taste is very bitter and nauseous. Boiling water extracts its sensible qualities more perfectly than alcohol. The colour of the infusion approaches to that of Madeira wine: it slightly reddens litmus paper, and strikes an olive colour with a solution of sulphate of iron without occasioning a precipitate. When sulphuric acid is added to the unstrained infusion, it emits the odour of tamarinds; and when the infusion is filtered and slowly evaporated, spicular crystals are formed, which appear to be tartaric acid.

Medical properties and uses.—Gratiola is cathartic, diuretic, and emetic, producing, in very large doses, all the effects of an irritative poison. It has been much recommended by the German physicians in dropsy; and has also been used in

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[1] It was first cultivated in Britain by Turner in 1568.

jaundice and worm cases. Hufeland found it extremely efficacious in visceral obstructions and scrofulous affections[1]; and we are even told that in the Vienna hospital it has cured the most confirmed cases of the lues venerea ![2]

It is given either in the form of powder, or of infusion combined with aromatics. The dose of the powder is grs. xv. to ℨss; that of the infusion, made with ℨij. of the dried herb and Oss. of warm water, from fℨiv. to f℥j. three times a day.

GUAIACUM.[3] *Spec. Plant. Willd.* ii. 538.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Zygophylleæ.

G. 819. *Calyx* five parted, unequal. *Petals* five, inserted into the calyx. *Capsule* angular, three or five celled.

Species 2. G. *officinale.* Officinal Guaiacum. *Med. Bot. 3d ed.* 557. *t.* 200.

Officinal. GUAIACI LIGNUM ET RESINA, *Lond.* GUAIACI OFFICINALIS LIGNUM-RESINA, *Edin.* GUAIACUM OFFICINALE; LIGNUM, RESINA, *Dub.* The wood and resin of Guaiacum.

Syn. Gayac, Gomme-resin de Gayac (*F.*), Gemeiner Franzosenholz, Guajakgummi (*G.*), Pokhout (*Dutch*), Franzos trace (*Dan.*), Franzosenholts (*Swed.*), Guajaco, Gommo-resina di Guajaco (*I.*), Guayaco (*S.*), Guajaco (*Port.*).

This tree is a native of Jamaica, Hispaniola, and the warmer parts of America.[4] It rises forty feet in height, and is four or five in circumference, with many divided knotted branches. The bark of the trunk is of a dark grey colour, variegated with greenish or purplish specks, but that of the branches is ash-coloured, with fissures. The leaves are abruptly pinnate, consisting of two or three pairs of smooth, shining, veined, obovate, dark green leaflets, almost sessile. The flowers are peduncled in a kind of umbels, which spring from the divisions of the smaller branches. The calyx consists of five concave, oblong, blunt, spreading, unequal, deciduous leaves; the petals are five, of a rich blue colour, elliptical, concave, and spreading; the stamens are erect and villous, with yellowish hooked anthers: the germen is oval, with a short style and simple stigma; and the capsule subturbinate, on a short pedicel, smooth, and of a pale ferruginous hue, pentagonous, with ribbed angles, and five-celled: but two or three of the cells are often abortive.[5] The seeds are solitary and angled.

All the parts of this tree possess medicinal qualities; but the wood and the peculiar substance afforded by it are the only parts used: the virtues of the wood depend altogether

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1 *Hufeland über die Natur, &c. der Scrofula.*
2 *Kostrewski, Dissert. de Gratiola,* p. 64.
3 The Spanish name, *Guayaco,* is derived from the Caribbee.—*Humboldt.*
4 The tree was cultivated in this country by the Duchess of Beaufort, 1699.
5 *Gært. de Fructibus,* ii. 148. t. 113. fig. 1.

on the peculiar matter it contains. This is spontaneously exuded from the tree, and is called native gum: it concretes in tears, which are semipellucid and very pure; but the greater part of it is obtained by making incisions into the trunk, or, as it is termed, jagging the tree. This operation is performed in May: and the juice, which flows copiously, is concreted by the sun. It is also obtained by sawing the wood into billets, and boring a hole longitudinally through them; so that, when one end of a billet is laid on a fire, the guaiac, melting, runs through the hole from the opposite end, and is collected in a calabash. Boiling the chips or raspings in salt and water, also separates the guaiac, which, as it rises to the surface, may be collected by skimming.

The wood is brought to this country either in large solid pieces, which weigh from four to five cwt. each, and are covered with a yellowish alburnum; or it is already rasped. The guaiac, or gum, as it is improperly termed, arrives in casks and mats: the former containing from one to four cwt., the latter generally less than one cwt. each.

Qualities.—The *wood* of guaiacum is inodorous, but when heated it emits an aromatic odour; and the taste is bitterish, subacrid, and biting. It is very hard, heavier than water; its sp. gr. 1·333; it is externally yellowish, and internally of a blackish brown colour mixed with green streaks. Its goodness may be ascertained by exposing its raspings to the fumes of nitrous acid, which give it a bluish-green colour, if it be good: yet the decoction is not affected by nitrous acid. The *resin*, or *guaiac*, has a fragrant odour, with scarcely any taste, but occasions, when swallowed, a sensation of heat in the throat. It has a resinous aspect; is of a greenish brown colour externally, and internally presents a mixture of greenish, reddish, and brownish tints. It is somewhat translucent, breaks with a vitreous fracture, and is easily reduced to a powder, which is grey at first, but becomes green in a short time when it is exposed to the air and light; a change which appears to depend on the absorption of oxygen.[1] The specific gravity of guaiac is 1·2289. It was generally regarded as a gum resin, till Mr. Brande's experiments showed it to be a substance *sui generis*, differing from both gum and resin.

When guaiac is digested in *water* a little extractive only is dissolved, in the proportion of 9 parts in 100, and the infusion

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[1] This effect of light and air was first noticed by Dr. Wollaston, who found that the most refrangible produced this change; and subsequent experiments of Mr. Brande clearly proved it to arise from oxygen. I found that the change takes place in an hour, when the powder is exposed to sunshine. It appears to be again deoxidized if exposed to the least refrangible rays only, according to Dr. Wollaston's experiments.

has a greenish brown colour and a sweetish taste. *Alcohol* dissolves readily 95 parts in 100, and the solution is decomposed by the mineral acids, affording precipitates which assume various tints of colour. (See *Tinctura Guaiaci.*) *Sulphuric ether* dissolves four parts in ten of guaiac, and when the solution is evaporated on water, it leaves a tough, pellucid, pale brown pellicle, which appears to be pure guaiac. It becomes green after some time; and a small portion of extractive remains dissolved in the water. The *alkaline solutions* and their carbonates dissolve it readily; and the solutions are precipitated by the diluted sulphuric, the nitric, and the hydrochloric acids. *Sulphuric acid* dissolves it with scarcely any effervescence; affording a solution of a rich claret-colour, which, when fresh prepared, deposits a lilac-coloured precipitate on the addition of water; and when heated, separates some charcoal. *Nitric acid* dissolves it with a strong effervescence and a copious extrication of nitrous fumes; and when the solution is evaporated, it yields a large portion of oxalic acid. The diluted acid converts it into a brown resinous substance. *Hrdrochloric acid* dissolves a small portion only, and affords a solution of a brown colour. I found that, during the solution of guaiac in these acids, the heat which was evolved raised the thermometer in the following proportions: in the sulphuric, 44; in the nitric, 120; and in the hydrochloric, 8 degrees. Nothing comes from the distillation of guaiac in water; but Mr. Brande obtained from 100 parts of it distilled *per se* in close vessels, the following products: acidulous water 5·5, thick brown oil 24·5, thin empyreumatic oil 30·0, charcoal remaining in the retort 30·5, and 9·5 of gases, which were chiefly carbonic acid and carbureted hydrogen.[1] From these experiments it is clear that guaiac differs from resin; and we also learn that the mineral acids are incompatible in prescriptions with it.

It is sometimes adulterated with common resin and manchinal gum. The former is detected by the turpentine emitted when the suspected guaiac is thrown on hot coals; and the latter, by adding to the alcoholic solution a few drops of sweet spirit of nitre, and diluting with water, the guaiac is precipitated, but the adulteration floats in white striæ.

Medical properties and uses.—Both the wood and the guaiac are stimulant, diaphoretic, diuretic, and purgative. The wood was introduced into Europe by the Spaniards, as a remedy for lues venerea, in 1508, by Gonsalvo Farrand, and gained much celebrity from curing Ulrich Van Hutten; but it had long

[1] *Philosophical Trans.* 1806, and *Phil. Mag.* xxv. 107.

before been used for the same purpose by the natives of St. Domingo: and it is not certain that Van Hutten's case was one of pure syphilis, as he had been suffering from the disease from the age of nine years. It obtained so much reputation, however, that the exhibition of mercury was discontinued for a considerable length of time[1]; and even in the eighteenth century its specific powers over this disease were maintained by Boerhaave: but frequent disappointments and more correct observations have shown that it possesses no powers of eradicating the venereal virus; and that it is useful only after a successful mercurial course, for repairing the strength and vigour of the system; "and where a thickened state of the ligaments, or of the periosteum, remains, or where there are foul indolent ulcers[2];" or in suspending the progress of some of the secondary symptoms for a short time, as ulcers of the tonsils, eruptions, and nodes. The decoction of the wood has been found more useful in cutaneous diseases, scrofulous affections of the membranes and ligaments, and in ozœna. The guaiac itself is an efficacious remedy in chronic rheumatism and arthritic affections[3], as well as those diseases for which the decoction of the wood is usually given; and in every respect it may be regarded as the active ingredient of the wood. Its sensible effects are a grateful sense of warmth in the stomach, dryness of the mouth, and thirst, with a copious flow of sweat, if the body be kept externally warm, or if the guaiac be united with opium and antimonials: but when the body is freely exposed to cool air, instead of producing diaphoresis, it augments considerably the secretion of urine. It may be exhibited either in substance or in tincture. The dose is from grs. x. to ℨ ss., in the form of pills or of bolus; or made into an emulsion with water by means of mucilage or yolk of egg. Larger doses purge.

Officinal preparations. Of the wood:—*Decoctum Guaiaci comp.*, E.D. Of the Guaiac:—*Mistura Guaiaci*, L. *Tinctura Guaiaci*, L. E. D. *Decoctum Sarsaparillæ comp.*, L. D. *Tinctura Guaiaci composita*, L. E. D. *Pulvis Aloes comp.*, L. D.

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[1] It was then sold for seven gold crowns a pound.

[2] *Pearson's Observations on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea*, p. 10.

[3] *The Chelsea Pensioner*, a nostrum by which Lord Amherst was cured of rheumatism, is composed of *Guaiac* ℨj., *Pulv. Rhei* ℨij., *Supertart. Potassæ* ℥j., *Sulph.* ℥ij., *Nucis myrist.* j. *in pulv. trit. et per opem mellis misce ut fiat Electuarium.* Two large spoonsful to be taken night and morning. *Jesuit Drops* also consist of *Guaiacum, Balsam of Copaiba*, and *Oil of Sassafras*, made into a tincture by spirit.—*Pharmacologia*, p. 237.

HÆMATOXYLON.[1] *Spec. Plant. Willd.* ii. 547.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

G. 830. *Calyx* five-parted. *Petals* five. *Capsule* lanceolate, one-celled, two valved, with the valves boat-shaped.

Species 1. H. *Campechianum.* The Logwood tree. *Med. Bot.* 3d *ed.* 455. *t.* 163.

Officinal. HÆMATOXYLUM, *Lond.* HÆMATOXYLI LIGNUM, *Edin. Dub.* Logwood.

Syn. Bois de Campèche (*F.*), Kampesch-holz, Blauholz (*G.*), Campechehout (*Dutch*), Campeschetraee (*Dan.*), Campechetrad (*Swed.*), Campeggio (*I.*), Palo de Campeche (*S.*), Pao de Campeche (*Portug.*).

This tree is a native of South America, and attains to great perfection at Campeachy, in the bay of Honduras. It was introduced into Jamaica in 1715, and from its quick growth now abounds in a degree which much incommodes the landholders in the neighbourhood of Savannah la Mar; flowering in March and April.[2] The stem and branches are generally crooked; the former is seldom above twenty inches thick; and the tree scarcely ever rises more than twenty-four feet in height. It is covered with a dark-coloured rough bark; and has many smaller ramifications, which are close, prickly, and beset with strong spines. The leaves are abruptly pinnate, each composed of four or five pairs of sessile, obcordate, obliquely nerved leaflets. The flowers are in terminal, spicular clusters; the calyx consists of brownish purple-coloured, oblong, obtuse segments; the petals are spreading, obtusely lanceolate, and of a reddish yellow colour. The stamens are downy, tapering, shorter than the corolla, with small oval anthers; the fruit is a double-valved pod, containing five or six small, flat, reniform seeds.

Logwood is brought to this country in logs, which are afterwards chipped. Those pieces which have a deeper colour are to be preferred. It is much employed as a dye-wood.

Qualities.—This wood is inodorous, but has a sweet astringent taste: it is hard, compact, heavy, and of a deep red colour, which it gives out both to water and alcohol. The recent infusions made with distilled water are yellow, but those with common water have a reddish purple colour, which is deepened by the alkalies, and changed to yellow by the acids.

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1 From αἱμα, blood, and ξυλον, wood.—*Millar's Dictionary.* The trivial name *Campechianum,* and the English term *Campechi* wood, originated from *Palo Campechio,* the name imposed by the Spaniards who first discovered the wood.

2 It was cultivated in this country by Mr. Millar in 1739; but is now seldom found in our hothouses.

They form precipitates with the sulphuric, nitric, hydrochloric, and acetic acids, solutions of alum, sulphates of iron and of copper, acetate of lead, and tartarized antimony [1]; which are, therefore, incompatible in prescriptions with these infusions and decoctions. The colour of the precipitates varies: those with the acids are reddish brown; with alum and tartarized antimony, violet; with sulphate of iron, bluish black; sulphate of copper, purplish blue; acetate of lead, reddish black; and sulphate of magnesia, purple. According to Chevreul, logwood contains a volatile oil, tannin, two kinds of colouring matter, — one of which is soluble both in water and alcohol, the other soluble in alcohol only, — acetate of lime and of potassa [2], and a peculiar substance, which is procured in small brilliant crystals of a reddish white colour, and a slightly astringent, bitter, and acrid taste; and which he named *hematin.* It is procured by digesting rasped logwood in water of the temperature 125°, filtering, and evaporating to dryness: then digesting the residue for a whole day in alcohol of sp. gr. 0·837, filtering, and concentrating by evaporation; a small portion of water is then to be added, and the evaporation being carried a little farther, it is to be left to crystallize. Crystals of hematin are formed in abundance.

Medical properties and uses.—Logwood is supposed to be astringent: but this is a questionable opinion; for although it produces an ink with sulphate of iron, it possesses no acerbity, and does not produce a precipitate with gelatine.[3] It is employed in diarrhœa, and in the latter stage of dysentery; but the extract is more usually ordered. It has the advantage of giving tone to the general system, and thus obviates the lax state of the intestines. When taken into the stomach, it imparts a red colour to the urine in twenty-five minutes after it is taken. The decoction may be taken in doses of two or three fluid ounces, frequently repeated.

Officinal preparation.—*Extractum Hæmatoxyli,* L.

HELLEBORUS. *Spec. Plant. Willd.* ii. 1335.

Cl. 13. *Ord.* 6. Polyandria Polygynia. *Nat. ord.* Ranunculaceæ.

G. 1089. *Calyx* none. *Petals* five or more. *Nectaries* bilabiate, tubular. *Capsules* many-seeded, nearly erect.

Species 3. H. *officinalis.* Officinal Hellebore. *Sibthorp, Flora Græca. Linnean Trans.* vol. viii. 305. *De Candolle, Systema Naturale,* vol. i. 316.

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[1] When an infusion or decoction of logwood is kept for some time, it becomes capable of producing a precipitate with gelatine; but when recent, no such effect takes place either with glue or isinglass. This was first observed by Dr. Bancroft.

[2] *Annales de Chimie,* lxvii. 254. *Thomson's Chymistry,* v. 206.

[3] Vide *Bancroft, Phil. of Permanent Colours,* 2d edit. vol. ii. p. 395.

Officinal. HELLEBORUS, *Lond.* HELLEBORI NIGRI RADIX, *Edin. Dub.* The root of black Hellebore.

Syn. Hellebore (*F.*), Schwartze Niesswurzel (*G.*), Swart Prustrot (*Swed.*), Elleboro negro (*I.*), Helleboro negro (*S.*), Kadugaroganic (*Tam.*), Kherbeksiya (*Pers.*), Kāli Koothie (*H.*), Kherbec usivud (*Arab.*).

Black hellebore, so named from the dark colour of the root, is a native of Austria, the Apennines, and Italy, flowering from December till March; whence it has been called Christmas rose, and has obtained a place in our gardens.[1] The root is perennial, transverse, rough, knotted, externally black, internally whitish, and sends off many depending fibres. The leaves, which are deep green, spring directly from the root, on long maculated petioles; and are composed generally of five leaflets, pedate, two being supported on one partial petiole on each side, and one terminal: the leaflets are ovato-lanceolate, smooth, shining, and coriaceous, with the upper half of each sparsely serrated. The flower-stalks are scapes, six or eight inches long, erect, round, somewhat tapering, sheathed, variegated with red, and bearing one or two flowers. The floral leaves supply the place of a calyx, are oval, and indented at the apex. The corolla consists of five large, roundish, concave spreading petals, at first white, with a tint of red, deepened by age, but finally changing to green, after the pollen is shed, and the seed impregnated. The nectaries are greenish yellow, tubular, two-lipped: the upper lip longer and slightly emarginate, the lower finely notched. The filaments are numerous and thread-like, with yellow anthers. The germens, which vary in number from four to eight, become beaked pods, containing many oval, black, shining seeds.

This plant has been supposed to be the ἑλλεβορος μελας of Hippocrates; but there is every reason for believing that the *officinalis* of Dr. Sibthorp is the drug of the ancients. It was found by Bellonius and Tournefort[2] growing in plenty about Mount Olympus, and the Island Anticyra, which was formerly celebrated for its production. Sometimes the roots of Helleborus *viridis*, Adonis *vernalis*, Trollius *Europæus*, Actæa *spicata*, Astrantia *major*, and Aconitum *neomontanum*, are, either ignorantly or fraudulently, substituted for those of black hellebore. These are distinguished chiefly by their colour being paler than the roots of the hellebore.

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[1] It was cultivated in Britain by Gerarde in 1596.

[2] *Bellonii Obs.* l. iii. c. 41. *Tournefort, Voyage,* ii. let. p. 21. 189.

Qualities.—The fibres of the roots, which are the parts used in medicine, are about the thickness of a straw, from four inches to a foot in length, corrugated, of a deep brown black on the outside, proceeding from a caudex, less than an inch in thickness, but several inches along, and internally white or yellowish, but exhibiting a grey earthy tinge. They have an unpleasant but feeble odour; and a sweetish, but nauseous, bitterish, acrid taste, benumbing the tongue, and leaving upon it an impression, "as when it hath been a little burnt with eating or supping any thing too hot."[1] The acrimony is impaired by keeping; and appears to depend on a volatile matter, as water distilled from the root has an acrid taste. Both alcohol and water extract its medicinal properties; and, as the spirituous preparation is the most active, these appear to depend on its resinous part. By coction with water it yields a very considerable portion of gummy matter and some resin. (*See the extract.*) According to MM. Feneulle and Capron, black hellebore contains a volatile oil, an acrid principle, and gum.

Medical properties and uses.—Black hellebore root is a drastic cathartic, and on this property probably depends its emmenagogue and hydragogue powers. In smaller doses it is supposed to act as an alterative. It has been much celebrated in mania, melancholy, dropsy, scabies, and worms; but does not appear to possess any particular advantages over the other resinous purgatives, which act with less virulence. As an emmenagogue it is useful in plethoric habits, when preparations of iron are contra-indicated. When black hellebore is taken in too large a dose, it occasions violent vomitings, inflammation of the stomach, vertigo, tremblings, convulsions, cramps, and death. These effects are to be obviated by evacuating the stomach, by drinking copiously of mild mucilaginous fluids, and then employing the most powerful antiphlogistic measures. (*See extract.*) It is seldom prescribed in substance; but either in the form of tincture or of extract, or of decoction made with two drachms of the root to a pint of water.[2] The dose of the root is from grs. x. to ℈j., which purges strongly; but to produce its other effects two or three grains are sufficient. Of the decoction f ℥ j. may be given every four hours.

Officinal preparations.—*Tinctura Hellebori,* L. E. D. *Extractum Hellebori nigri,* E. D.

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[1] Grew.

[2] Wintringham, *Thesaurus Med.* p. 87.

HELONIAS.

Cl. 23. *Ord.* 1. Polygamia Monœcia. *Nat. ord.* Melanthaceæ.
Species — H. *Sabadilla.* Sabadilla plant. *Don, Ed. Ph. Journ. Retz. Obs. Bot. p.* 29.
Officinal. SABADILLA, *Lond.*

Syn. Cevadille, poudre de capucin (*F.*).

This plant is a native of Mexico. The stem is annual, rising from a foot to two feet in height, and terminated with a spike of dark purple bisexual flowers, intermingled with males by abortion. The floral envelope consists of six sepals, three of which are exterior: the stamens are six, inserted into the base of the calyx, and supported on filaments broadest towards the lower part: the pistils are three, with short styles and simple stigmas. The capsules are also three, oblong, yellowish, not exceeding four lines in length, with three cells, each containing two black, elongated, somewhat pointed seeds.

Qualities.—The seeds of sabadilla are inodorous, of a bitter acrid taste. They have been analysed by Pelletier and Caventou, and found to contain a gallate of Veratria; a peculiar odorous acid, which they have named *Cevadic;* elaïne and stearine; wax; a yellow colouring matter; gum and lignin. But according to a subsequent analysis by M. Couerbe, sabadilla contains a distinct alkali, which he has denominated *Sabadilline,* crystallizing in white, six-sided, acicular prisms, acrid, fusible like a resinoid, soluble in water, very soluble in alcohol, but insoluble in ether, and capable of forming salts with sulphuric and hydrochloric acids. Couerbe also mentions a substance resembling a gum resin, which he names *Monohydrate of Sabadalline,* red, very soluble in water and alcohol, scarcely soluble in ether, capable of forming crystallizable salts with the acids, and precipitated from its solutions by the alkalies, without combining with them.

Medical properties and uses.—Sabadilla operates as a drastic cathartic with so much violence that it is scarcely ever internally administered: nevertheless Schmuker has given it in cases of tœnia, and carried the dose of the powder to half a drachm. It is externally applied to destroy pediculi; yet, even in this mode of using it, if the scalp be denuded or ulcerated, vertigo, convulsions, and sometimes death, have followed its employment. Its introduction into the Pharmacopœia is for obtaining Veratria. (*See Part III.*)

Officinal preparation.— *Veratria,* L.

HIRUDO.[1] *Syst. Nat. Gmelin.* i. 3095.
Div. 3. *Cl.* 1. Articulata, Annelidæ, *Cuv.*
G. 280. Body oblong, truncated at both extremities, cartilaginous, moving by dilating the head and tail.
Sp. 2. H. *medicinalis.* The medicinal Leech. *Amœnit. Academ.* vii. 40. *Treatise on the Med. Leech, by J. R. Johnson, Lond.* 1816. *Hist. Nat. des Sangsues, par J. L. Derheims, Paris,* 1825.
Officinal. HIRUDO, *Lond.* HIRUDO MEDICINALIS, *Dub.* The Leech.

Syn. Sangsue (*F.*), Blutegel, Ægle, Lyche-lake (*G.*), Blodigle (*Dan.*), Pijavoka (*Polish*), Sanguisuca, Mignatta (*I.*), Sanguijuela (*S.*), Khĕruheen (*Arab.*), Jonc (*H.*), Jelauca (*Sans.*), Utter (*Tam.*), Patchet (*Malay*), Zeloo (*Pers.*), Lek, Leikeis (*Mæso-Gothic*), Læc, Lece (*Saxon*), Lækare, Læknare (*Gothic* and *Swed.*), Likær (*Sclav.*).

This species of leech is common throughout Europe, America, and India, inhabiting lakes and stagnant pools. Many of the leeches used in England are brought from France, which again is supplied from Spain, Bohemia, and the frontiers of Turkey. The body is about three inches long, tapering towards the head, composed of semi-cartilaginous, dilatable rings, usually about one hundred, increasing in size, but not in number, with age. They are capable of only a certain degree of extension. The body is capable of being very much lengthened and contracted. The colour of the back is dark olive, divided by four yellow, or buff-coloured, longitudinal lines, two of which are lateral, with a black line running through their centres: and the other two, which are on the upper part of the back, dividing it into three nearly equal parts, are broken with black macula. Within these lateral and upper lines are two others, which appear like chains of black and yellow. The belly is pale olive, thickly maculated with black, or very dark blue, irregular spots. The skin is mucose, spongy, and covered with a black pigment, formed of molecules of various sizes. The surface is extremely susceptible of touch. The head, when the animal is at rest, is a disk of a horse-shoe shape, composed of three capillary straight muscles, radiating from the gorge to the circumference of the disk. There are ten points arranged in a crescent at the back of the head, deep black, and when moistened having a fine lustre, which are supposed to be eyes. The mouth consists of two lips, placed in the centre of a horse-shoe sucker which is under the head; within it are three small white

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[1] Βδελλα Græcorum. Named by the Romans *haurio,* expressive of its well-known peculiar action.—*Johnson's Treatise,* p. 40.

bodies which act as teeth: these are somewhat pyramidal, plaited, lanceolate, and hollow; they can be dilated with air by the animal, so as to assume this form, in which state they are sufficiently tense to pierce the skin of man and other animals. When all the three teeth are forced into the skin they form a triangular puncture.[1] Straus-Durkheim says that the teeth are small, horny, numerous, and form a kind of saw[2]: and at the anal extremity there is a broad circular sucker, fibrous, with the fibres, which are fleshy, divaricating from a central point[3], by which the animal attaches itself to different bodies.

Leeches are oviparous. They are androgynous, and the generative process is performed by reciprocal and spontaneous impregnation. The ova are cocoons, each of which contains nine leeches. The young escape from the cocoon in 26 to 28 days.[4] All the cocoons are discharged in one involucre, near the surface and the margins of pools, and are hatched by the heat of the sun. They do not cast the skin, as has been generally supposed, but at certain times throw off a tough slimy substance from their bodies, apparently the production of disease; and from which they get disencumbered by drawing themselves through between the moss and the matted roots of rushes.[5] During winter they remain almost torpid, hid amongst the thick network of aquatic roots which surround the pools. They are very tenacious of life; for they live for many days in the exhausted receiver of an air-pump, and in gases and other media which in general are destructive of animal life. This is to be explained by the slow oxygenation of the blood which takes place in the breathing vesicles.

Norfolk supplies a great part of the leeches which are brought to the London market; some are taken also in Suffolk, Hampshire, Kent, Essex, and Wales, but many are imported from Bourdeaux and Lisbon.[6] La Brenne in France furnishes a large number. They are caught in spring and autumn by people who wade into the pools and allow

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[1] *Derheims, Hist. Nat. des Sangsues.*

[2] *Consid. générales sur l'anatomie comp. des animaux articulés*, p. 220.

[3] The organs of touch are supposed to reside in the lips and disc of the caudal extremity; those of taste, in some nervous fibrillæ in the upper part of the œsophagus; those of hearing, unknown; and of smell, probably, in the punctata respiratoria. The leech, however, breathes by oscula with gills, under which are small bags situated beneath the intestinal canal.

[4] *Journ. de Phys. experien.* tome vii. 1827.

[5] I give this on the authority of Mr. Dickson of Covent Garden, who has made many curious observations on the economy of the leech.

[6] These differ from English leeches chiefly in having the belly of one uniform colour.

them to fasten on their limbs; or, more generally, the catchers beat, as they wade in, the surface of the water with poles, which sets the leeches in motion, and brings them to the surface; when they are taken with the hand and put into bags. As they come to the surface just before a thunder-storm, this is regarded as a good time for collecting them. They are put into bags and pressed very closely together. They are best preserved in wooden vessels half filled with soft water, kept in an equal and moderate temperature (50° Fahr.), and covered over with a coarse cloth so as to admit the air. When the number is great, the water should be drawn off by a cock, placed about $2\frac{1}{2}$ inches above the bottom of the vessel, which should be covered with a layer of moss-turf and wood charcoal, with some small stones heavy enough to keep the turf in its place; and several small roots of the Acorus *calamus* should be placed in the vessel to vegetate, as this plant is supposed to yield nutriment to the leeches.[1] The water should be changed once a week; and all the dead or sickly leeches,—such, for instance, as feel flabby, or exhibit protuberances or white ulcerated spots on the body,—should be removed from the general stock, for they are subject to many diseases and great mortality. When the water is not changed, the leech suffers from inflammation of the intestinal canal, in which case it will not suck. Leeches which have been used should not be returned to the stock till they appear to have completely regained their health and vigour, which is known by their feeling hard and firm when handled. As we are ignorant of their proper and natural food, it is useless to attempt to feed them[2]; but in winter it would, perhaps, be advantageous to put some moss into the vessel in which they are preserved. Owing to the scarcity of the medicinal leech, a species, named *troctina* by Dr. Johnson, has been much used. It differs from the medicinal leech in being marked with golden-coloured rings surrounding a black spot, on a brown ground: the sides are yellowish, and the belly greenish yellow, spotted with black.

Medical uses.—Leeches appear to have been first used by Themison.[3] They are applied in cases where there is local congestion, and in febrile affections, accompanied with local

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[1] *Horn's Archiv. für medizinische*, &c. Jan. 1826.

[2] Dr. Johnson says they live by adhering to and sucking the fluids of fish, frogs, &c.; but they take no kind of solid food.—*Treatise on the Medicinal Leech*, p. 61.

[3] The annual consumption of leeches in Paris alone is three millions. *Richard's Hist. Nat. Med.* tom. i. p. 357.

inflammation, and in which local blood-letting is consequently necessary, as in ophthalmia; and particularly to places where cupping-glasses cannot be applied. In some habits, where there is a disposition to erysipelatous inflammation, their bites, which are triangular, occasion a considerable degree of irritation, and œdematous swellings follow, which are exceedingly troublesome; but in general they easily heal, and occasion no inconvenience. It is sometimes exceedingly difficult to make them bite, which they never will do when they are sick. The best mode of applying them, is to take them out of the water for some minutes before they are to be used, and to dry them well with a very soft cloth directly before they are applied. The part should also be well cleaned with soap and water, then washed with a little pure water, and made very dry. If there be any hairs on the spot, these must be close shaved. I have found this method preferable to that of wetting the part with milk and sugar, blood, or any other matter.[1] When they, nevertheless, will not readily fix, or when it is wished to apply them very exactly on a particular spot, as, for instance, close to the angle of the eye in ophthalmia, Dr. Johnson recommends to puncture the part with a lancet; but I find that putting them into a large quill cut at both ends, and applying the end at which the head of the animal lies to the part, with the finger over the other end, is an excellent mode of making them bite. The quill is withdrawn after they are firmly fixed. They drop off spontaneously whenever they have gorged themselves with blood; and they may be separated at any time by sprinkling a little salt on the head. Very few leeches can draw more than half a fluid ounce of blood; and, therefore, it is necessary, in order to increase the quantity, to keep the orifices bleeding by bathing them with hot water, or by the application of a hot dry towel or a poultice. It has been recommended to cut off the tail of the leech, so as to allow the blood to be discharged as fast as it is sucked, the leech continuing to suck notwithstanding this mutilation. The cause of the leech dropping off when it is full, has never been philosophically examined. It appears to me to depend on the compression of the breathing vesicles[2] of the animal, by the distension of the stomach and intestinal canal, opposed by the skin having only a limited extensibility, so that the animal being no longer able to breathe falls into

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[1] Dr. Johnson recommends that they be put into a cup of porter, "which will induce them to bite with great avidity."—*l. c.*

[2] These vesicles are arranged along each side of the animal, appearing by an external pore which is guarded with rays that act as gills when the animal is in the water.

a state of asphyxia; consequently it loses all muscular energy; and thus, being unable to retain itself longer on the part, it drops off. After leeches drop off, the application of a very little salt makes them disgorge all the blood they have sucked: and if they be immediately thrown into clean water, and this repeatedly changed for three or four times, they soon recover their health and vigour. Dr. Johnson advises the use of vinegar instead of salt, which is not apt to blister the lips of the leech as salt does, preventing it from sucking for some considerable time; but, perhaps, it is still better merely to strip them through the fingers, and then throw them into clean water. Sometimes it is extremely difficult to stop the hæmorrhage from leech-bites in children: every kind of styptic has been used without effect, and the result has proved fatal. In obstinate cases, a small sewing needle may be passed across the wound, and a thread twisted round it thus  as in the operation for hare-lip.

HORDEUM. *Spec. Plant. Willd.* i. 472.

Cl. 3. *Ord.* 2. Triandria Digynia. *Nat. ord.* Gramineæ.
G. 151. *Calyx* lateral, two-valved, one-flowered, three-fold.
Species 3. H. *distichon.* Common Barley. *Viborg-Cereal,* 35. *t.* 3.
Officinal. HORDEUM, *Lond.* HORDEI DISTICHI SEMINA, *Edin.* HORDEUM DISTICHUM: SEMINA DECORTICATA, *Dub.* Barley.

Syn. Orge mondé (*F.*), Gerstengraupen (*G.*), Gemeenegerst (*Dutch*), Byg (*Dan.*), Korn (*Swed.*), Jeezmien (*Pol.*), Orzo (*I.*), Cebada (*S.*), Cevada (*Port.*), low (*H.*), Bārlee Arise (*Tam.*), Dhourra (*Arab.*).

Barley is asserted by Reidesel to be a native of Tartary, but the fact is not well ascertained.[1] It is an annual plant, and cultivated in almost every country of Europe. This species, which is the most generally cultivated in Britain, H. *distichon,* has a long flat spike or ear, with a double row of defective or male florets on each flat side, and a single row of fertile florets at each edge. The valves of the calyx, or outer chaff, are linear, and one half shorter than the corolla or inner chaff, which terminates in a straight, serrated awn or beard, sixteen times its own length. When ripe, the husk is coriaceous, angular, and continues close about the grain, which, when freed from it, is ovate, grooved, and angular.

Barley is used as an article of food, but less so than it was in former times; and it is now chiefly cultivated for the purpose of forming malt liquors and ardent spirits. It is formed into pearl-barley by two different operations; the barley is first spread out and moistened; and then, in this state, by means of machinery, is denuded of the cuticle, or shelled. It is after-

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1 Carden asserts that it is a native of Athol, in Scotland. Diodorus Siculus refers it to Egypt, where, he says, Osiris found it wild, and first cultivated it.

wards rounded in a mill, which at the same time polishes the little granules into which it is formed.

Qualities.—Barley, in its natural state is oval, oblong, pointed at one end, obtuse at the other, and furrowed longitudinally: it has a mild, sweetish taste. Pearl-barley is inodorous, and has a slightly sweetish taste. It consists of roundish granules of a pearly whiteness, composed almost entirely of starch, with some gluten, mucilage, and saccharine matter[1], which are dissolved in boiling water. The decoction very soon runs into the acetous fermentation. Barley is never used medicinally in substance.

Officinal preparations.—*Decoctum Hordei,* L. E. D. *Decoctum Hordei compositum,* L. D.

HUMULUS. *Spec. Plant. Willd.* iv. 769.

Cl. 22. *Ord.* 5. Diœcia Pentandria. *Nat. ord.* Urticeæ.

G. 1795. *Male.* *Calyx* five-leaved. *Corolla* none.

——— *Female.* *Calyx* one-leafed, obliquely spreading, entire. *Corolla* none. *Styles* two. *Seed* one, within a leafy calyx.

Species 1. H. *Lupulus.* The Hop. *Eng. Bot. t.* 427. *Smith's Flor. Brit.* 1077. *Bigelow's Amer. Med. Bot.* iii. 163.

Officinal. LUPULUS, *Lond.* HUMULI STROBILI, *Edin.* STROBILI SICCATI, *Dub.* The Strobiles of the Hop.

Syn. Houblon grimpant (*F.*), Hopfen (*G.*), Lupulo (*I.*), Hoblon (*S.*).

The hop is an indigenous perennial plant, growing in hedges, and flowering in July. It is very abundantly cultivated in Kent, Essex, Surrey, and Suffolk: and the strobiles are picked about the end of August or the beginning of September.[2] The root sends up many long, striated, angled, rough, flexible stems, which support themselves by twining round upright bodies in a spiral direction from left to right. The leaves are opposite, in pairs, petiolate, heart-shaped, serrated, entire, or lobed, and of a dark green colour on the upper disc. Both

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[1] Einhof, who analysed barley both in the unripe and ripe state, found that 3840 parts of barley, in grain, afforded 430 of a volatile matter, 720 husk, and 2690 of meal; and from the same quantity of barley-meal, he obtained 360 of *volatile matter,* 44 *albumen,* 200 *saccharine matter,* 176 *mucilage,* 9 *phosphate of lime,* with some *albumen,* 135 *gluten,* 260 *husk,* with some *gluten* and *starch,* and 2580 of *starch:* 76 parts were lost in the analysis. When this meal is macerated in alcohol it yields a yellow-coloured, acrid, thick oil, which is supposed to give the peculiar flavour to spirits from raw grain, and to be lost in malting.—*Thomson's Chymistry,* v. 254.

[2] The culture of the hop-plant was introduced into England from Flanders in 1524, and the strobiles were first used for preserving English beer in the latter part of the reign of Henry VIII.; but the prejudice against them was very considerable, and the city of London, a hundred years afterwards, petitioned the parliament to prevent their use. There are now, however, severe penalties inflicted on brewers who use any other bitter for preserving their beer. In 1830, the number of acres cultivated with hops in Great Britain, were 46,727; the average quantity of hops grown is about 20,000,000 of pounds.

the leaves and petioles are scabrous, with minute prickles; and at the base of each leaf-stalk are two interfoliaceous, entire, reflected, smooth stipules. The flowers are axillary, and furnished with bracteas: the males are yellowish white, in panicles, and drooping; the females, which are on distinct plants, are in solitary cones or strobiles, ovate, and pendulous; composed of membranous scales of a pale greenish colour, tubular from being rolled in at the base, and two-flowered, each containing one round, flattish seed of a bay-brown colour, surrounded with a sharp rim, and compressed at the tip.

At the proper season, while the strobiles are yet scarcely ripe, the plants are cut about three feet from the ground, the poles on which they are twined pulled up, and the strobiles carefully picked off one by one. Those that are over-ripe or defective are separated from those that are ripe enough, and both kinds are carried to the kiln as soon as possible after they are picked. The heat of the kiln requires to be regulated with great nicety; and in order to prevent them from drying too fast, many kilns have two floors, on the uppermost of which the greener hops are laid, and gradually dried before being brought to support the heat of the lower floor.[1] Charcoal is the fuel usually employed; other kinds of fuel injuring the flavour of the hops. The strobiles are considered sufficiently dried when they become crisp; but they acquire a degree of toughness and tenacity before they are bagged, from being laid in heaps in the storehouses. Five pounds of moist or under-ripe hops make one pound only when taken from the kiln. The best hops are brought to market in fine canvass sacks called "pockets," each of which contains about 1¼ cwt. of hops.

Qualities.—Hops have a strong, peculiar, fragrant, subnarcotic odour, and a very bitter, aromatic, astringent taste. They have a pale, greenish yellow hue, appear like thin transparent veined leaves; and although not tough, yet are difficult to pulverize. Sir J. E. Smith and M. Planche had noticed a yellow powder which is secreted by the scales of the hop: and some experiments by Dr. A. W. Ives of New York proved, that the active properties of the strobiles reside in that substance, which forms one sixth part only of their weight, and which is easily separated, by merely sifting in a fine sieve. Dr. Ives named it *lupulin.* It has the peculiar flavour of hops, and under the microscope seems to resemble the pollen of plants, consisting of globules filled with a yellow fluid. He found in 120 grains of lupulin five grains of tannin, ten of extractive, eleven of bitter principle, twelve of wax, thirty-six

[1] This is the case at Farnham in Surrey. See *Stevenson's Survey,* 363.

of resin, and forty-six of woody fibre (lignin). MM. Chevalier and Payen obtained 26 parts of a peculiar bitter principle, 105 of resin, and traces of gum, volatile and fixed oil, some azotized matter, and various salts. It is probable, that this bitter principle is the active agent in the hop. Hops, from which all the lupulin is separated, yield an extract, devoid of the virtues of the hop.[1] The properties of the strobiles are extracted by boiling water, or alcohol, or ether. The watery infusion has a pale straw-colour, is rendered muddy by the mineral acids; alkalies deepen its colour; it strikes an olive with sulphate of iron; is precipitated by alcohol, solution of superacetate of lead, nitrate of silver, and tartarized antimony; and, when rubbed with magnesia or lime, a rod dipped in hydrochloric acid discovers the presence of ammonia. The ethereal tincture, when evaporated on water, leaves a pellicle of greenish, intensely bitter resin, and deposits some extractive. By distillation in water, hops yield a volatile aromatic oil. From these experiments they appear to contain resin, extractive, volatile oil, tannin, an ammoniacal salt, and what has been termed the bitter principle.

Medical properties and uses.—Hops are narcotic, tonic, diuretic; and, externally applied, anodyne, and discutient. Their use as a preservative of beer has been long known. They are also said to possess the power of procuring sleep in the delirium of fever, and in mania, when used as a pillow; and owing to this effect having taken place in the case of George the Third, their efficacy as a general narcotic, when introduced into the stomach, has been investigated.[2] Dr. Maton observed, that, besides allaying pain and producing sleep, the preparations of hops reduce the frequency of the pulse, and increase its firmness in a very direct manner. One drachm of the tincture and four grains of the extract given once in six hours reduced the pulsations from ninety-six to sixty in twenty-four hours.[3] He found the extract exceedingly efficacious in allaying the pain of articular rheumatism; but our own experience has not afforded us sufficient proof of its utility as a sedative; and Dr. Bigsby's[4] experiments have lessened very much the confidence practitioners were disposed to give to it. An ointment compounded with the powder of the hop and lard is recommended by Mr. Freake as an anodyne application to cancerous sores. We have seen a fomentation

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1 *Annals of Phil.* p. 194.

2 *De Roche, De Humuli Lupuli Viribus medicis.*

3 *Observations on the Humulus Lupulus,* &c. by A. Freak.

4 Vide *London Medical Repository,* vol. v. p. 97.

of it afford relief in painful swellings and tumours. It may be given in the form of powder, infusion, tincture, or extract. The dose of the powder is from grs. iij. to ℈j.; of the infusion, which is made with ℥ss. of the hops and O j. of boiling water, f℥ jss., with f ℥ ss. of cinnamon water, may be given twice or thrice a day.

Officinal preparations.—*Extractum Lupuli,* L. *Infusum Lupuli,* L. *Extractum Humuli Lupuli,* D. *Tinctura Lupuli,* L. *Tinctura Humuli,* E. D.

HYDRARGYRUM.[1] Mercury or Quicksilver.

Syn. Mercure (*F.*), Quicksilber (*G.*), Kwitzilver (*Belg.*), Quicsolv (*Dan.*), Quicksilver (*Swed.*), Mercurio (*I.*), Azógue (*S. & Portug.*), Abue (*Arab.*) Pára (*H.*), Sodum (*San.*), Rassum (*Tam.*), Parah (*Duk.*), Seemab (*Pers.*), Rassa (*Malay*).

This metal is found in Spain, Germany, and Hungary; Siberia, the Philippines, China, and Peru. The most productive mines are those of Idria, Carinthia, and the Palatinate; Almaden near Cordova, in Spain[2]; and Guanca Velica near Potosi, in Peru.[3] It is procured,

A. In its metallic state:

i. Unalloyed.	Sp. 1. *Native Mercury.*	
ii. Alloyed with silver.	1. *Native amalgam.*	
iii. With sulphur.	1. *Cinnabar.*	Var. *a.* Dark red. *b.* Bright red.
	2. *Hepatic ore,* or *carbo-sulphuret.*	Var. *a.* Compact. *b.* Slaty.

B. Oxidized.

iv. Combined with chlorine, and a portion of sulphuric acid.	Sp. 1. *Corneous Mercury.*

Native quicksilver is found either in globules, disseminated on the surface, or collected in the crevices of other mercurial ores, and in marlite, calcareous spar, or other fossils. It has the lustre, opacity, fluidity, and other qualities of the pure metal; but, owing to the small quantity which is found of it, the quicksilver of commerce is usually obtained from cinnabar. This ore is red, varying in the shades of its colour, and in the degrees of its lustre. It occurs massive, disseminated, and crystallized: in the two former states always opaque, and in

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[1] Ὑδράργυρος Græcorum.

[2] This is the oldest and the richest mine of cinnabar in Europe. It was wrought by the Romans two thousand years ago; and yields about 6000 quintals of fluid mercury annually.

[3] These were discovered in 1566 and 1567, by Henry Garces, a Portuguese. Garces was a native of Porto, and went to Peru in the Spanish service. Examining one day the red earth which the Indians used as paint, and called *limpi,* he observed it was native cinnabar; and, knowing that mercury was extracted from cinnabar in Europe, he began to work the Peruvian mines.

the latter translucent, or transparent. To obtain the metal the ore, after being sorted, is reduced to powder, and mingled with about one fourth of quicklime in powder. This mixture is put into large iron retorts, which are placed in a long furnace, and glass receivers adapted to each, but not luted until all the moisture it contains be driven off; the joinings of the vessels are then closely stopped with well-tempered clay, and a full red heat kept up for seven or eight hours, in which time the mercury is volatilized, and condensed in the receiver. About ten ounces of mercury are usually obtained from 100 lbs. of the ore.[1] We have no authentic information to enable us to fix the period when mercury was first known; but the Greeks were well acquainted with it; and Aristotle mentions a wooden Venus which moved by its means, probably on the same principle as the Chinese puppets, to which motion is given by means of mercury.[2]

Officinal. HYDRARGYRUM, *Lond.* HYDRARGYRUS, *Edin.* HYDRARGYRUM, *Dub.* Quicksilver.

Syn. Mercure coulant (*F.*). Vide *Hydrargyrum.*

The greater part of the quicksilver which is used in this country is brought from Austria in leather bags, containing 31 lbs. of the metal; they are packed in casks, two or three together in one cask. Some, however, is brought from Spain in iron bottles, which contain from 60 lbs. to 1 cwt. of mercury.[3] It is often adulterated by the admixture of lead, bismuth, zinc, or tin. When the metal quickly loses its lustre, is covered with a film, or is less fluid and mobile than usual, leaves a stain on a delft plate, or does not readily divide into round globules, but into those with tails, it may be suspected. Lead is discovered by shaking a portion of the suspected mercury in distilled water, then digesting in distilled vinegar, and adding to the solution water saturated with sulphureted hydrogen gas, which gives a brown precipitate if lead be present; and by this means one part of lead may be detected in 15·260 of mercury. Bismuth is detected by pouring the nitric solution into distilled water, when the bismuth will appear as a white precipitate. Exposing the mercury to heat detects zinc; and tin is discovered by a weak nitromuriatic solution of gold, which is precipitated purple by tin. It is purified by distillation with iron-filings, or by agi-

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1 *Aikin's Chymical Dictionary.*

2 For the manner in which this is effected, see *Muschenbrock's Introd. in Phil. Nat.* i. p. 153.

3 The quicksilver mines in both Spain and Austria are a government monopoly.

tation in diluted sulphuric acid until the acid cease to become turbid; and then, after washing and drying the globules into which it has been divided, passing them through a pin-hole in the bottom of a funnel of writing paper.[1]

Qualities.—Pure mercury is inodorous, insipid, and of a bright white or silver colour. Its specific gravity is 13·568.[2] It is always fluid at the ordinary temperature of the atmosphere, but becomes a solid malleable metal in a degree of cold sufficient to sink the thermometer to 39° below 0 of Fahrenheit, in which state its sp. gr. is 15·612.[3] It boils at 662°, and is volatilized unchanged in close vessels, but is not capable of combustion.[4] Mercury is oxidized by the air at its usual temperature, when subjected to agitation, and is fully saturated with oxygen at a continued heat of 600°. It is oxidized by and combines with sulphuric acid at a boiling heat, and with nitric acid at 60° Fahrenheit; and its oxides, which are two, a protoxide and a binoxide, enter into combinations with acids. It unites with chlorine, iodine, sulphur, phosphorus, and cyanogen; and combines with many metals, forming what are called amalgams.

Medical properties and uses.—Mercury in its metallic state exerts no action on the animal system. It has, nevertheless, been administered in doses of a pound or more with the view of operating mechanically, and overcoming by its weight the obstruction of the intestines which exists in ileus; but, as it cannot act by its gravity on the ascending part of the bowels, it is not easy to conceive how it should have been ever recommended; and the events of the cases in which it has been given have sufficiently proved the futility of the practice.

Mercury, however, when prepared for medicinal use, is a remedy of the most extensive application. It is a powerful and general stimulant, but its effects are certainly different from those of other articles which are ranked in the same class. It enters into the circulation, quickens the vascular action, and excites powerfully the whole of the capillary system; increasing all the secretions and excretions, and has even been detected in the urine.[5] It has been supposed that it is peculiarly determined to the salivary glands; but if, as

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1 This method was invented by Professor Brunchi, of Pisa. Vide *Phil. Mag.* iv. p. 348.

2 *Cavendish.*

3 *Crichton, Phil. Mag.* xiv. 49.

4 *Thomson's Chymistry,* i. 175. If, however, the galvanic fluid be passed through it, the beautiful luminous stars in which it is dispersed seem to prove its combustibility.

5 *Mem. della Reale Acad. di Torino,* tom. xxix. p. 228.

there is every reason to suppose, these glands are endowed with more irritability[1] than the rest of the habit, it is easy to conceive that the same degree of stimulus, which is operating on the whole system, will produce a greater effect on them in a direct ratio according to their greater susceptibility. But although the general action of the preparations of mercury is stimulant, yet they produce different effects, operating sometimes as stimulants, sometimes as cathartics, or emmenagogues, and locally as errhines: and hence the great variety of diseases in which mercurials have been found useful; as febrile affections, spasms, cachectic diseases, glandular obstructions, cutaneous eruptions, membranous inflammation, &c. (See *Preparations and Compositions.*)

But the most important effect of the preparations of mercury is their specific operation in syphilis. They were used, and their effects, when accumulated in the habit, were known so early as the 13th century; and the writings of Theodorick[2] contain cautions against catching cold during the course; but the first notice of mercury as a remedy in lues venerea is contained in a tract by Jo. Almenar, a Spaniard, published in 1516, who recommends it after the manner of the Arabians, but condemns pushing the remedy so as to promote salivation. In a tract on Syphilis by Laurentius Phrisius, published in 1532[3], four formulæ of ointments in which mercury is an ingredient are given under the title of *Unguenta Empiricorum;* but it does not appear that it had been used as an external application, by regular practitioners, from the year 1527, at which time it was introduced by Berengarius, a surgeon at Carpo. Physicians, however, did not venture to give mercury internally till Paracelsus broke the fetters of ancient authority, and proved that it might be exhibited not only with safety but with advantage. Since his time, a period of nearly 300 years, experience has fully sanctioned its use: but although, as Mr. Pearson justly observes, "not one medicine besides, derived from the animal, vegetable, or mineral kingdom, has maintained its credit, with men actually employed in extensive practice, during a tenth part of that period[4];" yet it is remarkable, that in the present day its

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[1] That the salivary glands, and their excretories, are very excitable, is evident from the flow of the saliva being much increased by affections of the mind, as the thinking of any kind of food which is particularly grateful to the taste.

[2] He was a friar, afterwards bishop of Cervia, and died between the years 1270 and 1280. See *Friend's History of Physic*, ii. 360.

[3] *Epitome opusculi de curandis pustulis, ulceribus, et doloribus morbi Gallici, mali Fruntzoss appellati, autore Laurentio Phrisio, artium et medicinæ doctore.*

[4] *Observations*, &c. p. 97.

utility in syphilis has been questioned.[1] Many various theories of the operation of mercury have been advanced: the most satisfactory of which is that of Mr. Hunter, who supposed that the stimulant operation of the mercury induces and maintains an action which is incompatible with the morbid action produced by the venereal virus, until the poison is either destroyed, or evacuated from the body by the excretories. But, whatever may be the principles on which it operates, its efficacy in syphilis is certain, when it is judiciously and cautiously administered. The mode of giving it, and the morbid effects which it produces under certain circumstances, shall be mentioned when its preparations are described; it is only necessary to observe further in this place, that although men of the first medical talents have, occasionally, declaimed against its use[2], and although much mischief may have of late years arisen from its indiscriminate employment by the speculative and the ignorant, yet, in the hands of judicious and cautious practitioners, it will continue to rank as one of the most useful of the articles of the materia medica.

Officinal preparations.[3]

I. By distillation to purify the metal.
    1. *Hydrargyrum purificatum*, D. *Hydrargyrus purificatus*, E.
II. By trituration; (*oxidized.*)
  a. With animal fat.
    2. *Unguentum Hydrargyri fortius*, L. *Ung. Hydrargyri*, D.
    3. ——— *Hydrargyri*, E.
    4. ——————— *mitius*, L. D.
    5. *Linimentum Hydrargyri compositum*, L.
    6. *Emplastrum Ammoniaci cum Hydrargyro*, L. D.
    ——— *Hydrargyri*, L. E.
  b. With saccharine substances.
    7. *Pilulæ Hydrargyri*, L. E. D.
  c. With carbonate of lime.
    8. *Hydrargyrum cum Cretâ*, L. D.
  d. With carbonate of magnesia.
    9. *Hydrargyrum cum Magnesiâ*, D.
III. By the action of heat and air; (*oxidized.*)
    10. *Hydrargyri Binoxydum*, L. *Hydrargyri Oxydum rubrum*, D.

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[1] *Medico-Chirurg. Trans.* vol. ix.
[2] *Saunders—Observations on the Hepatitis of India*, &c.
[3] In forming this table, we have been much assisted by the excellent table drawn up by Dr. Duncan, jun. in the Edinburgh New Dispensatory; and we trust our alterations will render it more practically useful.

IV. By the action of acids.

a. With sulphuric acid; (*oxidized.*)

11. *Subsulphas Hydrargyri flavus*, E. *Oxydum Hydrargyri sulphuricum*, D.
12. *Hydrargyri Persulphas*, D.

b. With nitric acid; (*oxidized.*)

13. *Unguentum Hydrargyri nitratis*, L. E. D.
14. *Unguentum Nitratis Hydrargyri fortius*, E.
    ——— ——— ——— *mitius*, E.
15. *Hydrargyri Nitrico oxydum*, L. *Oxydum Hydrargyri rubrum per Acidum nitricum*, E. *Hydrargyri Oxydum nitricum*, E.
16. *Unguentum Hydrargyri nitrico-oxydi*, L. D. *Unguentum Oxydi Hydrargyri rubri*, E. *Unguentum Hydrargyri Oxidi-nitrici*, D.

c. With chlorine.

† sublimed.

17. *Hydrargyri chloridum*, L. *Submurias Hydrargyri mitis*, E. *Calomelas sublimatum*, D.
18. *Pilulæ Hydrargyri chloridi*, L.
19. *Hydrargyri bichloridum*, L. *Murias Hydrargyri corrosivus*, E. *Murias Hydrargyri corrosivum*, D.
20. *Liquor Hydrargyri Bichloridi*, L.

† † precipitated.

21. *Submurias (chloridum) Hydrargyri præcipitatus*, E. *Calomelas præcipitatum*, D.

d. With acetous acid; (*suboxidized.*)

22. *Acetas Hydrargyri*, E. D.

e. With cyanogen.

23. *Hydrargyri Bicyanidum*, L.

V. By precipitation with earths and alkalies from acid solutions.

a. By lime-water from the solution of the bichloride.

24. *Hydrargyri Oxidum*, L.

b. With liquor potassæ from calomel.

25. *Hydrargyri Oxydum nigrum*, D.

c. By ammonia from the nitric solution; (*suboxidized.*)

26. *Oxydum Hydrargyri cinereum*, E.

d. By ammonia from the solution of the bichloride; (*oxidized.*)

27. *Submurias Hydrargyri ammoniatum*, D. *Hydrargyri Ammonio-chloridum*, L.
28. *Unguentum Submuriatis Hydrargyri ammoniati*, D. *Ung. Ammonio-chloridi*, L.

VI. Combined with sulphur.

a. By trituration.

29. *Sulphuretum Hydrargyri nigrum*, E. D.

b. Sublimated.

30. *Hydrargyrum Sulphuretum cum Sulphure*, L. D. *Hydrargyri Bisulphuretum*, L.

VII. Combined with Iodine.

a. By trituration.

31. *Hydrargyri Iodidum*, L. *Hydrargyri Biniodidum*, L.

HYOSCYAMUS.[1] *Spec. Plant. Willd.* i. 1010.
Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.
G. 378. *Corolla* funnel-shaped, obtuse. *Stamens* inclined. *Capsule* covered with a lid, two-celled.
Spec. 1. H. *niger.* Common Henbane. *Med. Bot. 3d. edit.* 204. *t.* 76. *Smith, Flor. Brit.* 598. *Eng. Bot.* 591.
Officinal. HYOSCYAMI FOLIA ET SEMINA, *Lond.* HYOSCYAMI NIGRI HERBA; SEMINA, *Edin.* HYOSCYAMUS; FOLIA, *Dub.* The leaves and seed of Henbane.

Syn. Jusquiame (*F.*), Bilsenkraut (*G.*), Bilsenkruid (*Dutch*), Fandensnosser (*Dan.*), Giusquiamo nero (*I.*), Beleno (*S.*), Yosciamo (*Port.*), Belmort (*Swed.*), Bielun (*Pol.*), Khorassānie Ajooam (*H.*), Sickran (*Arab.*), Khorasanie onsum (*Tam.*), Buzirulbury (*Pers.*), Adas-pedas (*Malay*), Adas (*Jav.*).

Common henbane is an indigenous annual, frequent on waste grounds, and at the sides of roads, particularly on a calcareous soil, flowering in July. The root is long, tapering compact, and fibrous; the stem erect, woody, round, and branched, rising about three feet in height. The leaves are alternate, sessile, and embracing the stem; large, the lower ones being above a foot in length; deeply sinuated, undulated, woolly, and of a sea-green colour. The flowers are in terminal, recurved, leafy, simple spikes; and each is simple and erect. The calyx is permanent, pitcher-shaped, with a regular, five-cleft border reticulated with veins; the corolla straw-coloured, and beautifully pencilled with a net-work of purple veins. The filaments are inserted into the tube of the corolla, tapering, downy at the base, and supporting purple anthers. The style is purplish, with a blunt round stigma. The capsule is globular, invested with the body of the calyx, bilocular, and closed with a convex smooth lid. It contains numerous small, irregular, brown seeds.[2]

The whole of the plant is covered with soft white hairs, feels clammy and slightly adhesive, and is poisonous when eaten.

Qualities.—The odour of the recent leaves is strong, somewhat fœtid, and narcotic[3]; and the taste mucilaginous and slightly acrid: but, when dry, they have scarcely either odour or taste. The virtues of the plant are completely extracted by diluted alcohol. The watery infusion is of a very pale yellow

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[1] Ὑος κυαμος, hog-bean.

[2] The seeds abound with oil, and may be eaten with impunity. The roots, which resemble parsnips, have occasionally been eaten, and fatal effects produced; although they are less active than the leaves. These roots, when moulded in the turning loom, and strung in the form of beads, are sold under the name of *Anodyne Necklaces,* and are worn by infants to allay the irritation of teething—a humiliating instance how deeply error is rooted in the human mind!

[3] In the recent state the odour of the leaves occasions stupor and delirium.

colour, and insipid; and has the narcotic odour of the plant. It is not altered by the acids. The alkalies change the colour to a deep greenish yellow, which, on the addition of an acid, disappears, and a brownish, flocculent precipitate is produced. It is copiously precipitated by solutions of acetate of lead, white; by nitrate of silver, black: sulphate of iron strikes with it a pale olive colour, and a dark precipitate is slowly formed. Thence henbane appears to contain resin, mucus, extractive, a peculiar alkaline salt, and gallic acid. MM. Meissner and Brandes have examined the nature of this alkaline salt, which they have named *Hyoscyamia;* and have ascertained that on it depend the peculiar virtues and the poisonous properties of the plant. The seeds contain a larger proportion of this alkaloid than either the leaves or the roots; it is in the form of a malate. It crystallizes in long prisms, and forms neutral salts with the acids.[1]

Medical properties and uses.—Henbane is narcotic. Its operation is very similar to that of opium, increasing at first the strength of the pulse, and producing some sense of heat; effects which are followed by proportional diminution of excitement, and sleep. In some habits it occasions diaphoresis or diuresis, and sometimes a pustular eruption; at other times it purges; and, in over doses, produces sickness, stupor, dimness of sight, hard pulse, delirium, and coma, with dilatation of the pupils; until the pulse, gradually becoming weak and tremulous, petechiæ make their appearance, and death ensues. Dissections show the effects of inflammation in the stomach, bowels, and the membranes of the brain. After an emetic is given, and the stomach fully cleared, vinegar is the best antidote.

Although the effects of henbane as an anodyne were known to the ancients[2], yet they were ill understood, and the use of the drug was almost completely relinquished till the time of Baron Stoerck, who may be regarded as having introduced it into practice. It may be employed in all the cases in which the use of opium is indicated, where the latter disagrees with the habit, or where its constipating effect is wished to be avoided. In painful and spasmodic affections, hysteria, rheumatism, and gout, much benefit has resulted from its use; and we have found that it is particularly serviceable, when united with colocynth or other powerful cathartics, in colica

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[1] *Rep. de Budmer,* 1821.

[2] "Hyosciamus in potu cibove sumptus, qualem ebriorum mentis alienationem infert."—*Dioscorid. Alexif.* xv. 407.

pictonum. We have long employed it, with decided advantage, in mania, in combination with camphor. It is used externally to lessen and allay the irritation of very sensible parts; thence fomentations of the leaves have been found serviceable in scrofulous and cancerous ulcers, hæmorrhoids, and other painful swellings; and Hufeland recommends the leaves and marshmallow flowers boiled in milk, with the addition of a few grains of acetate of lead, as a topical application in scrofulous ophthalmia. Smoking the leaves, like tobacco, is said to allay the pain of toothach. Its effects in dilating the pupil, when an infusion of it is dropped into the eye, are similar to those of belladonna, and thence it is also employed as a preparative to the operation for cataract. It is used, generally, in the forms of extract and tincture only; but should not be prescribed in combinations with alkalies, as these destroy its narcotic powers in twenty-four hours.

Officinal preparations.—*Extractum Hyosciami,* L. E. D. *Tinctura Hyosciami,* L. E. D.

HYSSOPUS, *Spec. Plant. Willd.* iii. 47.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. Ord.* Labiatæ.

G. 1096. *Corolla,* lower lip three-parted, with a small intermediate subcrenate segment. *Stamens* straight, distant.

Species 1. H. *officinalis.* Common Hyssop. *Med. Bot. 3d edit.* 318. *t.* 113.

Officinal. HYSSOPI OFFICINALIS HERBA, *Edin.* The herbaceous part and leaves of Hyssop.

Syn. Hyssope (*F.*), Isop (*G.*), Yzoop (*Dutch*), Isop (*Dan.* & *Swed.*), Isopo (*I.*), Hysopo (*S.*), Hyssopo (*Port.*), Zufāiy yeăbus (*Arab.*).

This is a perennial plant, a native of Siberia and Austria; cultivated in our gardens[1], and flowering from June to September. The root is knobbed, woody, and fibrous: the stalk about two feet in height, obscurely quadrangular, erect, shrubby, and branching. The leaves do not exceed an inch in length, and one third of an inch in breadth, are sessile, of a somewhat glaucous deep green colour, elliptical, entire, punctured, and stand in pairs. The flowers are produced on one side, in long, half-verticillated, terminal spikes, and intermixed with leaves. The calyx is persistent, nearly tubular, divided at the edge into five acute teeth, striated, and of a purplish colour at first, but afterwards green: the corolla is violet-coloured, with a long whitish tube; the upper lip short, round, and notched at the apex; the lower one separated into

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1 It was first cultivated in England by Gerarde, in 1596. It is not the *esof* of the Hebrews, nor the *ὕσσωπος* of the Greeks. It has been supposed to be the *zife* or *cyfe* of the Arabians.—*Alston's Mat. Med.* ii. 152.

three segments, the undermost of which is inversely ovate. The filaments are crowned with simple anthers; the style is slender and bifid; and the seeds are four, at the bottom of the calyx.

Qualities.—The leaves of hyssop have an agreeable, aromatic odour, and a bitterish, moderately warm taste; qualities that appear to depend on a volatile oil of a yellow colour, which can be obtained separate by distillation with water. It is elevated by alcohol also, but soon exhales, and the spirit loses the odour it had when newly distilled.

Medical properties and uses.—Hyssop is stimulant and tonic. It has been recommended in hysteria; and was formerly applied in catarrhal and other pulmonary affections, with the view of promoting expectoration; but the stimulant properties of hyssop render its use doubtful in these diseases; and, as a tonic, it scarcely merits the least attention.

INULA. *Spec. Plant. Willd.* iii. 2089.
Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Compositæ.
G. 1489. *Receptacle* naked. *Pappus* simple. *Anthers* ending in two bristles at the base.
Species. I. *Helenium.* Elecampane. *Med. Bot. 3d edit.* 64. *t.* 26. *Smith, Flora Brit.* 890. *Flora Danica, t.* 728.
Officinal. INULA HELENIUM; RADIX, *Dub.* Elecampane root.

Syn. Inula Lalenière (*F.*), Alantwurzel (*G.*), Alantzwortel (*Dutch*), Aland (*Dan.* & *Swed.*), Omanowy (*Pol.*), Enula Campana (*I.*), Enula Campana (*S.*), Usululrason (*Arab.*), Beykzunjebulshamee (*Pers.*).

This species of inula is an indigenous perennial, found occasionally in pastures and rich moist soils[1], flowering in July and August, and ripening its seed in September. The root is thick, branched, externally of a brown or grey colour, and internally white. The stem, which rises about three feet in height, is leafy, round, and furrowed; branched near the top, and villous. The leaves are large, ovate, serrated, veined, of a deep green colour on the upper surface; and on the under, reticulated, tomentose, and whitish: the radical ones are petiolate, but those of the stem sessile and embracing. The flowers are terminal, solitary, large, and of a golden colour. The calyx is scaly: the exterior scales are large, ovate, imbricated, and externally tomentose; the interior are narrow, linear, equal, and chaffy. The florets of the ray are numerous, spreading, twice the length of the calyx, linear, with the apex tridentate. The anthers end in two bristles at the base. The seeds are quadrangular, smooth, slightly curved, and

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[1] Ἑλένιον Dioscoridis. It is not unfrequent in Essex.—*Hudson.* Between Worcester and Ludlow, and Bishop's Castle and Newton.—*Smith.* I have seen it near Ewell, Surrey.

furnished with a somewhat chaffy pappus. The receptacle is reticulate and papillous.

The roots of elecampane found in the shops are generally obtained from garden plants. They are fit for use in the second year of their growth; and at this age are preferable to the older roots, which become stringy and woody. They should be dug up in autumn.

Qualities.—Elecampane root when dry has an aromatic yet slightly fœtid odour; and, when chewed, the taste is at first disagreeable, glutinous, and in some degree resembling that of rancid soap; then aromatic, bitter, and hot. According to the analysis of Funke, elecampane contains, 1. a volatile oil, which crystallizes; 2. a peculiar fecula (*Inulin?*); 3. extractive matter; 4. free acetic acid; 5. resin; 6. albumen; 7. fibrous matter. Both water and alcohol extract its virtues: the tincture possessing more of the bitterness and pungency of the root than the watery infusion. The decoction, after standing some hours, deposits a white powder resembling starch in appearance; but its properties show it to be a distinct principle; and it has, therefore, been named *Inulin.*[1] In distillation with water, this root yields a concrete, flaky substance, which seems to hold an intermediate place between camphor and volatile oil in its nature.[2]

Medical properties and uses.—Elecampane is usually ranked as a tonic; and supposed to possess deobstruent, diuretic, and expectorant properties. It was formerly regarded as a remedy of great efficacy in dyspeptic affections, flatulencies, palsy, dropsies, uterine obstructions, and pulmonary complaints; but Cullen observed, that its diuretic powers were trifling; and could not discover that it possessed any expectorant properties.[3] It is scarcely ever used by the regular practitioner. The dose of the powdered root may be from ℈ j. to ʒ j.

Officinal preparation.—*Confectio Piperis nigri,* L. D.

IODINUM. *Iodine.*

Officinal. IODINUM, *Dub.* Iodine.

Syn. Iode (*F.*), Iod (*G.*), Iodina (*I.*).

This peculiar substance exists, in a state of nature, in a great number of marine plants; namely, in Fucus *vesiculosus,* F. *serratus,* F. *nodosus;* in Porphyra *umbilicalis,* Padina *pavonia,* Ulva *linza,* Laminaria *saccharina* and *digitata,* Chorda *filum;* Gelidium *cartilagineum;* Kalysaris *polypidiculis;* Phyllophera *rubens;* Rhodominia *palmata,* and many of the marine Con-

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[1] This substance, which was first noticed and its properties investigated by Rose, was named by Dr. Thomson, *System of Chymistry,* 4th edit. iv. 697.

[2] *Newman's Chym. by Lewis,* 2d edit. ii. 216.

[3] *Mat. Med.* ii. 459.

fervæ; in some ores; in sea water in combination with sodium; in many mineral waters[1]; and in the rock salt of the Tyrol: in sponges, and in the envelopes of the eggs of the Cuttle fish. It was discovered in 1812 by M. Courtois, a manufacturer of saltpetre in Paris, and soon occupied the attention of many chymists, and its real nature was determined by Gay Lussac and Sir H. Davy. Dr. Wollaston pointed out the following method of procuring it:—

Digest kelp[2] in water, as long as any soluble matter is taken up; then evaporate the solution, to separate by repeated crystallizations all the salts of soda which it contains. To the mother liquor add cautiously sulphuric acid in excess; then boil for some time, and leave the whole at rest. Decant off the clear fluid, introduce it into a glass retort, and add as much of the black oxide of manganese as there has been sulphuric acid employed. On distilling this mixture, the iodine comes over in beautiful violet-coloured vapours[3], which condense in the receiver in the form of brilliant blackish, or rather bluish grey scales. The iodine is afterwards purified by mixing it in a retort with a little water and $\frac{5}{100}$ parts of potassa; then distilling in a sand bath, condensing the vapours in a very cool, large receiver, and drying the iodine by pressing it between folds of bibulous paper. It ought to be kept in glass-stoppered bottles. The theory of the process is simple. The peroxide of manganese decomposes the hydriodic acid of the hydriodate contained in the mother liquor, forming water, and setting the iodine free, which distils over; whilst the sulphuric acid, which was necessary for decomposing the carbonates, &c., forms sulphates of the salts and the oxide of manganese, and is left in the still.

Qualities.—Iodine, as has already been stated, is procured in the form of scales of a metallic lustre, a bluish grey colour, and having an acrid taste and the odour of chlorine. It may also be obtained in crystals, the primitive form of which is a rhombic octahedron. Its sp. gr. is 4·948. It tinges the skin yellow. It melts at 224½° Fahr., and at 347° volatilizes; and when moisture is present this occurs even at low temperatures; the vapour having a rich violet colour and a sp. gr. of 8·716. It is a non-conductor of electricity. It is soluble in 7000 of water, colouring the fluid

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[1] Those of Bonnington; Robin's well at Leamington Priors; the old well at Cheltenham; the sulphureous waters of Nuovo d'Asti.

[2] French kelp affords less iodine than British kelp: but the Cape of Good Hope kelp still more than the British.

[3] Whence its name, from ἰώδης, violet-coloured.

orange-yellow, is more soluble in alcohol, and still more in sulphuric ether. It unites with many simple bodies, forming compounds that are named *iodides.* With oxygen it forms iodic acid, with hydrogen hydriodic acid. Dissolved in alcohol it forms a tincture which is employed in medicine, and as a test of the presence of starch, with which it forms *Iodide of Amidine,* which has a beautiful blue colour. Starch is so delicate a test for iodine, that, according to M. Gaultier de Claubry, it detects it in solutions in which the proportion of the iodine does not exceed $\frac{1}{450000}$ of the liquid.[1] The atomic weight of iodine is 126·3.

Iodine is occasionally adulterated with oxide of manganese and charcoal. To detect this, M. Robiquet directs the mixture to be submitted to sublimation; and the residue weighed: it may also be detected by dissolving the suspected iodine in alcohol, and ascertaining the weight of the residue. The iodine of commerce contains generally about 12 parts in 100 of water, which should be separated before the iodine is used for making the tincture. The adulteration with water is detected by pressing the specimen between bibulous paper.

Medical properties and uses.—Iodine operates as a stimulant, acting topically, and also entering the system, and exciting powerfully the capillaries. It has been successfully employed in bronchocele, swelled testicle, scrofula, and other glandular swellings; and has succeeded in reducing enlargements of the liver and spleen when mercury has failed. It has also been administered in paralysis, with variable success; and Dr. Baron, of Gloucester, Iory, Lugot, and others, have used it with benefit in ascites. Like foxglove, it does not act while the abdomen is tense, and the absorbents are compressed by the fluids; but after tapping, and reducing excitement by bleeding, it completely removes the serum. The health is afterwards restored by tonics. On these grounds, I am at present trying it in ovarian dropsy, after tapping: and in two cases it has so far succeeded, that the tumours have not again enlarged. Its influence as an *emmenagogue* depends on the uterus sharing the excitement it induces. Cases are also recorded in which iodine has cured chorea, after arsenic and carbonate of iron had failed.[2]

With regard to the *modus operandi* of iodine, it is evident that it enters the circulation, and affects the whole capillary

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[1] Heat destroys this test; and the presence of the alkalies renders it nugatory. I discovered that the iodine in the iodides, and hydriodates, is instantly set free by pouring over them chlorine gas; and then starch displays its presence. This is a test for it in all mixed fluids.

[2] *Medical Gazette,* vol. i. p. 55.

system, as during its operation in diminishing diseased glands the healthy glands are also affected. I have detected it, by gaseous chlorine, in the urine of patients, where the dose of the tincture has been carried to the extent of fifty drops twice a day; and its presence may be recognised in all the secretions. Endeavouring to clear this point by experiments on dogs, although the iodine was detected in the urine, yet I could not perceive the least trace of it in the chyle.

The use of iodine is sometimes productive of bad effects. When it has been taken daily for a long time, it is apt to excite inflammatory gastric dyspepsia; salivation has occurred during its use. It also may cause reduction of strength, great disturbance of the nervous system, often resembling paralysis agitans, profuse perspirations, pains of stomach and bowels, nausea, purging, vertigo, and headaches; absorption of the mammæ, wasting of the testicles, and general emaciation. When these symptoms occur, its use should be either intermitted or relinquished. In large doses it operates as an irritant poison.

Iodine is equally useful, whether exhibited internally or applied externally. As an internal medicine, it is most commonly given in the form of tincture; as an external application the tincture is also useful; or the iodine may be formed into an ointment. It has also lately been employed in the form of vapour, inhaled into the lungs, in tubercular phthisis. It augments the secretion of the bronchial mucus.

Officinal preparations.—*Tinctura Iodinii composita*, L. *Tinctura Iodinii*, D. *Unguentum Iodinii*, L. D. *Potassæ Iodidum*, L. *Plumbi Iodidum*, L. *Hydrargyri Biniodidum*, L. *Ferri Iodidum*, L. *Potassæ Hydriodas*, D.

IRIS.[1] *Spec. Plant. Willd.* i. 224.

Cl. 3. *Ord.* 1. Triandria Monogynia. *Nat. ord.* Irideæ.

G. 97. *Corolla* six-parted; the alternate segments reflected. *Stigmas* petal-like.

* *Bearded with ensiform leaves.*

Species 7. I. *Florentina.*[2] Florentine Iris. *Med. Bot. 3d edit. t.* 262. *Sibthorp, Flora, Græca,* 28. *t.* 39.

Officinal. IRIDIS FLORENTINÆ RADIX, *Edin.* The root of Florentine Iris.

Syn. Iris de Florence (*F.*), Violenwurzel (*G.*), Florentynse Isis (*Dutch*), Violrot (*Swed.*), Violron (*Dan.*), Iyrsa (*Arab.*), Irva (*H.*), Ireos (*I.*), Lirio de Florencia (*S.*), Lirio de Florença (*Port.*).

This species of Iris, which is found in a wild state in Carniola, the island of Rhodes, Laconia, and other places of the

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[1] "Iris a cœlestis arcus similitudine nomen obtinuit."—*Dioscorides.*
[2] Ἶρις Theophrasti.

south of Europe, is cultivated in our gardens[1]; flowering in May and June. The root is tuberous, horizontal, somewhat jointed, and sends off many fibres from the under part. The leaves spring directly from the root, spreading in opposite directions, are sheathing, sword-shaped, vertical, nerved, curved inwards at the apex, and of a sea-green colour, yellowish at the base. From amidst them the stem rises, upwards of a foot in height, erect, simple, naked, round, and commonly bearing two flowers. The flowers are large, of a pale whitish blue colour, erect, terminal, and inodorous, bursting from a ventricose, nerved, floral leaf. The petals are alternate, three larger and three smaller: the larger have thickish claws, about an inch long, bordered with a thin edge, green on the outside, and bearded within with yellow-tipped, white hairs: the border is an inch in width, and longer; reflected, whitish, and striated near the flexure; the smaller are whitish blue, stand erect, are bent inwards, with a reflected margin; and have thick, attenuated, greenish claws. The anthers are white, covered by the stigmas, which have the colour of the corolla, and are cleft at the apex into two acute, serrated, upright segments. The capsules are three-celled, containing many seeds horizontally placed.

The roots of the Florentine iris are brought in a dry state from Leghorn, packed in large casks. They are in irregular knobbed pieces, with the cuticle pared off; of a dirty yellowish white colour, and full of small holes, which mark the places whence the radical fibres issued. The best pieces break with a rough but not fibrous fracture.

Qualities.—These roots, when recent, have a bitterish, nauseous taste, and are very acrid; but this acrimony is lost by drying. In their dry state they are brittle, easily pulverized, have a sweetish bitter taste, with a slight degree of pungency, and the agreeable odour of the violet, for which they are chiefly valued. When chymically examined, they appear to consist principally of fecula, with a portion of mucilage and saccharine matter; a solid fixed, and a volatile oil; and to contain malic acid, as their infusion strikes a brown colour with sulphate of iron.

Medical properties and uses.—The dry root is nearly inert. It does not merit a place in the list of materia medica.

JUNIPERUS. *Spec. Plant. Willd.* iv. 851.

Cl. 22. *Ord.* 13. Diœcia Monadelphia. *Nat. ord.* Coniferæ.

G. 1841. Male. *Amentum* ovate. *Calyx* a scale. *Corolla* none. *Stamens* three.—Female. *Calyx* three-parted. *Petals* three.

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[1] It was cultivated by Gerarde in 1596.

Styles three. *Berry* three-sided, irregular, with the three tubercles of the calyx.
Species 6. J. *Sabina.* Savine. *Med. Bot. 3d edit.* 10. *t.* 5.
Species 10. J. *communis.* Common Juniper. *Med. Bot. 3d edit.* 13. *t.* 6. *Smith, Flora Brit.* 1085. *Eng. Bot.* 1130.
Species 14. J. *Lycia.*

1. JUNIPERUS SABINA.[1]

Officinal. SABINA, *Lond.* JUNIPERI SABINÆ FOLIA, *Edin. Dub.* Savine-leaves.

Syn. Savinier (*F.*), Sadebaum, Sevenbaum (*G.*), Sevenboom (*Dutch*), Svebom (*Dan.*), Savina (*I.*), Sabina (*S.*).

This shrub is a native of Siberia and Tartary and the Levant; but it has been long cultivated in our gardens, flowering in April, May, and June. It seldom rises above three feet in height in this country, but, in Tartary, it attains fifteen feet; is covered with a brown bark, and divided into numerous branches, which are completely invested with very small, erect, firm, opposite, pointed leaves of a bright green colour, that lie over one another, and terminate the branches in sharp points, giving the whole shrub a very lively aspect. The *male* and *female* flowers are on different plants. The *male* catkin consists of three opposite flowers placed in a triple row, and a tenth flower at the end: and at the base of each flower is a broad scale fixed laterally to a columnar pedicel. There are filaments in the terminal flower only; tapering and united at the base, with simple anthers, which are sessile in the lateral flowers. In the *female* flowers, the calyx is three permanent scales; the petals are stiff, sharp, and also permanent; and the germen supports three styles with simple stigmas. The fruit is a spurious fleshy berry of a blackish purple colour; marked with tubercles, the vestiges of the calyx and petals, and containing three small hard seeds.

Qualities.—The leaves and tops of savine have a strong heavy, disagreeable odour, and a bitter, hot taste, with a considerable degree of acrimony. These qualities depend on an essential oil, which is obtained in considerable quantity by distillation with water. Both water and alcohol extract the active principles of savine; and Lewis found that, "on inspissating the spirituous tincture, there remains an extract consisting of two distinct substances; of which one is yellow, unctuous or oily, bitterish, and very pungent; the other black, resinous, tenacious, less pungent, and subastringent."[2]

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[1] Βραθυς Dioscoridis. There are two varities of savine; the variety β is our plant.
[2] *Mat. Medica.*

Medical properties and uses.—Savine is a powerful stimulant, possessing diaphoretic, emmenagogue, and anthelmintic properties. It has certainly a considerable effect on the uterine system; but, on account of its stimulating properties, is suited to those cases only of amenorrhœa which are unattended by fever, and in which the circulation is languid. In plethoric habits its use should be preceded by repeated bleedings[1]; and at all times its internal exhibition requires caution. It has been given in gout, and in worm cases also, but it is seldom prescribed. As an external local stimulant or escharotic, the dried leaves in powder are applied to warts, flabby ulcers, and carious bones; and the expressed juice diluted, or an infusion of the leaves, as a lotion to gangrenous sores, scabies, and tinea capitis; or mixed with lard and wax as an issue-ointment. The dose of the powdered leaves is from grs. v. to grs. xv. administered two or three times a day.

Officinal preparations.—*Oleum volatile Juniperi Sabinæ*, E. D. *Extractum Sabinæ*, D. *Ceratum Sabinæ*, L.

2. JUNIPERUS COMMUNIS.[2]

Officinal. JUNIPERI FRUCTUS ET CACUMINA, *Lond.* JUNIPERI COMMUNIS BACCÆ, *Edin.* JUNIPERUS; BACCÆ, CACUMINA, *Dub.* Juniper-berries.

Syn. Genevrier ordinaire (*F.*), Wachholderbeeren (*G.*), Sevenboom (*Dutch*), Sevebom (*Dan.*), Ginepro (*I.*), Enebro (*S.*), Zimbro (*Portug.*), Caw-caw-ynew muna (*Cree Indian*).

The common juniper is indigenous, growing on heaths and chalky hills, and flowering in May. It is a branching, rigid, smooth, evergreen shrub: when planted in a good soil, it rises to fifteen feet in height. The leaves are very numerous, narrow, entire, sharply-pointed, channelled, of a glaucous colour on the upper surface, and sessile, standing in ternaries. The catkins are axillary, sessile, solitary, ovate, small, and furnished with bractes: the male flowers yellow at first, and afterwards brown, with great abundance of pollen; the female smaller, and of a yellowish-green colour. The fruit is globular, in colour blackish-purple with a glaucous bloom, composed of the scales of the amentum, which become fleshy and coalesce. The seeds are three, and angular.[3]

The fruit requires to remain two years on the tree before it is fully ripe. The greater quantity of juniper berries, as the fruit is termed, used in Britain, is brought from Germany, Holland, and Italy. Some are brought from Greece, but they are the fruit of I. *oxycædrus.*[4] The Italian berries

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[1] Home, *Clinical Experiments*, 387.

[2] 'Αρκευθος μικρα Dioscoridis.

[3] The resinous substance known by the name of Sandarach, which is brought from Morocco, exudes from the stem of the juniper in warm climates.

[4] *Sibthorp.*

are less shrivelled, and have a fresher and more beautiful bloom upon them than the German, and are therefore generally preferred. They are imported in bags.[1]

Qualities.—Juniper-berries have a peculiar aromatic odour, and a sweetish, pungent, bitterish taste, when chewed. In distillation with water they yield a volatile, terebinthinate oil of a greenish colour, on which their virtues depend.[2] Both water and alcohol extract their active properties. Their principal constituents are mucus, saccharine matter, and volatile oil. Tromdorff analysed the berries, and procured of volatile oil 10 parts, wax 40 + resin 100 + sugar, acetate and malate of lime 338 + mucus 70 + fibres, and some other saline matters 350 = 908. The quantity of the volatile oil in this analysis was only 1 per cent.; but the usual quantity obtained is $2\frac{1}{2}$ per cent. According to Votter and Dann 21lbs. of the fresh fruit yield ʒ xxvj. of clear oil. Every part of the plant yields the same oil.

Medical properties and uses.—Juniper-berries are stomachic and diuretic. Like oil of turpentine, they impart the odour of violets to the urine. They have been long known as a remedy in hydropic affections; but they cannot be depended on alone, although they form an excellent adjunct to foxglove and squill. The tops are also used. They have been recommended in scorbutic and cutaneous affections; and Rosenstein asserts that a strong decoction of them soon clears the hands in scabies. The berries are sometimes given in substance, triturated with sugar or some neutral salt: but the best form is that of infusion, made with ℥ iij. of the berries bruised, and Oj. of boiling water. The dose of the first preparation is from ℈j. to ʒ ss.; that of the infusion a teacupful every three or four hours.

Officinal preparations.—*Oleum Juniperi,* L. E. D. *Spiritus Juniperi compositus,* L. E. D.

3. JUNIPERUS LYCIA.

The Edinburgh College regards this species of juniper as the source of olibanum, but Dr. Sibthorp asserts that this is not the case. The Indian olibanum, that found in the shops, is the produce of the Boswellia *serrata.* (See B. *serrata*).

KINO. *Vide* PTEROCARPUS.

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[1] The quantity annually imported into the United Kingdom is about 800 tons.

[2] The flavour and diuretic properties of Hollands depend on this oil. English gin is flavoured by oil of turpentine.

KRAMERIA. *Flora Peruv.* tom. i. p. 61.

Cl. 4. *Ord.* 1. Tetrandria Monogynia. *Nat. ord.* Polygaleæ.

G. 253. *Calyx* none. *Corolla*, four petals: the superior *nectary* three-parted; and inferior two-leaved.[1] *Berry* dry, echinated, and containing one seed.

Spec. 1. K. *triandra*. Triandrous Krameria. *Flor. Peruv.* tom. i. p. 61. *Icon.* xciii. *Woodville's Med. Bot. 3d edit.* vol. v. p. 129. *t.*

Officinal. KRAMERIÆ RADIX, *Lond.* RHATANIA, RADIX ET EXTRACTUM, *Dub.* Krameria or Ratanhy Root.

Syn. Ratanhie (*F.*), Ruiz para los dientes (*S.*), Ratanhia (*Huanaco*), Mapato (*Tarma*).

This plant is a native of Peru, growing on the argillaceous, sandy, and arid acclivities of the mountains in the provinces of Huanuco, Tarma, Canta, Xauxa, Caxtambo, and Huamalies, and very abundantly near the city of Huanuco.[2] It was also found by Humboldt in the province of Guancabunba in Peru. It flowers throughout the year; but is in the height of blossom in October and November. It is a shrub with very long, much branched, spreading roots, of a blackish-red colour exteriorly, red interiorly, and having an intensely bitter styptic taste. The stem is procumbent, round, and divided into numerous branches, which when young are white and silky, but as they grow they become naked below, and acquire a black colour. The leaves are sparse, sessile, oblong-obovate, pointed, entire, and covered with a white silky pubescence on both surfaces. The flowers are terminal, solitary, and pedunculated. The corolla, for there is no calyx, is subpapilionaceous, consisting of four lake-coloured petals, the inferior larger than the others, seriaceous externally, but internally smooth and shining: the nectary is tetraphyllous, the two upper leaflets being spathulate, the two lower roundish, concave, and scale-like. The stamens are three, each composed of a flesh-coloured filament, inserted between the germen and the superior leaflets of the nectary, and an urceolate anther, terminated with a pencil of very short hairs, and perforated with two holes at the apex. The style is red, awl-shaped, supporting a simple stigma, and seated on an ovate germen, which changes to a dry, hirsute drupe.

Ratanhy-root is collected for medicinal purposes after the rains. As imported, it consists of pieces of various sizes; but seldom exceeding an inch in thickness, much branched,

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[1] This part of Willdenow's character applies solely to *K. ixina*, the *pentapetala* of the *Flora Peruviana*, the only species which he describes. The name *Ratanhia* signifies trailing plant.

[2] It was first noticed by Ruiz in 1780 in the province of Tarma.

and the extreme ramifications minute. The root breaks short, exhibiting in the fracture a woody centre, and an easily separable, fibrous, dark-red bark. The thinner pieces are the best, as the proportion of bark is greater than on the thicker pieces.

Qualities.—The bark of ratanhy-root, when chewed, tastes bitter, astringent, and at first nauseous; but the impression left in the mouth is sweetish and astringent, not unlike that produced by catechu. The woody centre is nearly insipid, and perfectly inert as a remedy. Ratanhy-root yields its properties to boiling water, affording a dark-brown infusion, which emits an odour not unlike that of a raw potato, tastes astringent and very bitter. All the mineral acids throw down copious precipitates when added to the infusion, but no precipitate is caused by acetic, citric, or oxalic acid. The pure alkalies produce no precipitate, but deepen the colour of the infusion to a rich claret-brown. Lime-water throws down a very copious pinkish precipitate, which is soluble in hydrochloric acid. Solution of sulphate of iron strikes a dark green colour with the infusion; that of acetate of lead throws down a pale brown precipitate, leaving the infusion nearly colourless and limpid; and tincture of iodine, a deep blue colour. Alcohol produces no effect on the infusion. Solution of isinglass separates tannin.

Ratanhy-root digested in alcohol yields a deep, reddish-brown tincture, which, when evaporated, leaves a deep red, brittle resin.[1] When this tincture is poured into water, it throws down the resin of a pink colour. In ether the tincture is less deep-coloured; and, when the ethereal tincture is evaporated on water, it leaves a pellicle of dark red resin on the surface, and a small quantity of extractive is diffused through the water, colouring it a light brown. From these experiments we may conclude, that the bark of ratanhy-root contains a large proportion of tannin, gum, fecula, and resin. From the effects of the mineral acids on the infusion, they may be regarded as incompatible in prescriptions with this root. Vogel states, that he found the constituents of 100 parts of the root to be 40·00 of a peculiar red astringent principle, 1·50 of mucilage, 0·50 starch, 48·00 fibrine, and 10·00 of water and loss. An extract made with cold water is of a reddish-brown colour, has a vitreous fracture, and the bitterness and astringency of the root: it is best prepared with alcohol.

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1 A saturated tincture of the root in brandy is called wine-colouring; and is used in Portugal to give roughness to port wines.

Medical properties and uses.—Ratanhy-root is powerfully astringent. It has been long esteemed in Peru as a remedy in dysentery attended with bloody stools; as a detergent in ulceration of the gums, and a stomachic corroborant. It is also employed for fixing the teeth, when they become loosened by the receding of the gums[1]; and for giving a fine red colour to the gums and lips. It is powerfully styptic when applied to wounds, and on this account has been used in internal hæmorrhages, particularly hæmaturia. Alibert states that it has been used with success in France, in cases of leucorrhæa. It is little known in Great Britain as a medicine, although it has been long known to those who manufacture port wine; and large quantities of its extract are prepared solely for this purpose in South America. It is certainly likely to prove a valuable addition to the Materia Medica, in intermittents, diarrhœas, hæmorrhages, and all cases in which astringents are indicated. It has also been found useful in chronic rheumatism; in gastrodynia, attended by dyspepsia, headach, and vertigo; and in all diseases of the digestive organs, in which the powers of the stomach are impaired. When there is great debility of the nervous system, it operates as powerfully and more immediately than the cinchona bark; whilst, in cases of general asthenia, its invigorating effects are very evident. Ratanhy-root may be exhibited in substance, or in the form of extract, or in infusion and decoction. The dose in substance is from grs. x. to ʒ ss.; of the infusion made with ℥ss. of the bruised root to f℥vj. of boiling water, from fʒx. to f℥ij.; and of the decoction, made with ℥ij. of the bruised root, and Oj. of distilled water, from f℥j. to f℥ij. The decoction is a bad form of preparation, as tannate of starch, insoluble in cold water and inert, is formed. On the Continent it is exhibited in the form of tincture, made by digesting for twelve days ℥iij. of the powdered root with ℥ij. of orange-peel, ℥ss. of serpentaria root, and ʒj. of saffron, in Oij. of rectified spirit of wine. The extract is also much used.

Officinal preparation.—*Infusum Krameriæ,* L.

LACTUCA. *Spec. Plant. Willd.* iii. 1523.

Cl. 19. *Ord.* 1. Syngenesia æqualis. *Nat. ord.* Compositæ.

G. 1404. *Receptacle* naked. *Calyx* imbricate, cylindrical, with a membranous margin *Pappus* simple, stipitate. *Seed* even.

Species 1. L. *sativa.* Garden Lettuce. *Blackwell, t.* 8.

Species 12. L. *virosa.* Strong-scented Lettuce. *Med. Bot. 3d edit.* 75. *t.* 31. *Smith, Flora Brit.* 819.

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[1] An excellent tooth-powder may be composed by mixing one part of finely powdered ratanhy-root with three parts of powdered charcoal.

1. LACTUCA SATIVA.[1]

Officinal. LACTUCARIUM, *Lond.* LACTUCÆ SATIVÆ HERBA; LACTUCARIUM, *Edin.* LACTUCA SATIVA, HERBA, *Dub.* The herbaceous part and inspissated juice of the Garden Lettuce.

Syn. Laitue (*F.*), Lattich (*G.*), Lataw Gewoone salade (*Dutch*), Lattuca (*I.*), Lechuga (*S.*), Khasky (*Arab.*).

This species of lettuce is cultivated almost generally over Europe. The root is fibrous; and sends up a corymbose stem, which sometimes rises three feet in height. The leaves are roundish, obovate, or cordate, shining, crisped, rugose, irregularly plaited, and of a yellowish-green colour; but the plant is so well known as to require no description. When it is in flower, the slightest touch on the pedicles occasions the exudation of drops of a white, opaque, milky-looking fluid. The leaves and stem, immediately under the cuticle, contain a secreted juice, which is pellucid and colourless when in the vessels of the plant, but becomes milky when first exposed to the air, and afterwards acquires a brownish colour, resembling that of East Indian opium. This is the *lactucarium*[2] of the Edinburgh college. The best method of procuring it, as first suggested by Mr. John Young, surgeon in Edinburgh, is to cut off the top of the stem, when it is in flower, about a foot above the ground, and to absorb the milky juice that exudes by means of a moist sponge, from which it can be again compressed into a proper vessel to be inspissated. But, as the cut surface soon ceases to bleed, another slice must be taken under the first; and this may be repeated as long as the fresh-cut surface will yield the juice. The process may be repeated two or three times a day. This juice is also collected upon wove cotton, about half a yard square, as proposed by Dr. Probart; and the impregnated cotton thrown into water, which is afterwards strained and evaporated. The same gentleman prepares an extract, by macerating the stalks and leaves in water, to extract the juice which concretes in the bark of the stems and in the old leaves after the plants have flowered and the leaves begin to turn yellow. But this extract is a much less powerful preparation than the lactucarium.

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[1] Θριδακίνη Theophrasti.

[2] This name was imposed by Dr. Duncan, sen. who first suggested its use as a narcotic. Vide *Obs. on Pulmonary Consumptions*, by A. Duncan, M. D. *Appen.* p. 162. The French call it *thridace,* from τρίδαξ, lettuce; but this is the inspissated juice of lettuce, not the lactucarium of the elder Duncan. M. Robinet has proposed to make a syrup of it, by adding to the expressed juice of the plant, just before it flowers, double the weight of sugar. He calculates that ℥j, of this syrup contains six grains of the extract.

Qualities.—Lactucarium has the colour, and, in some degree, the taste and odour, of opium. Distilled water dissolves the greater portion of it; and the clear solution is of a deep brown colour; but Ganzel and others who have examined it obtained no morphia. It contains extractive, resin, and mucilage; and Dr. John states, that caoutchouc also is one of its components.

Medical properties and uses.—Lactucarium has been proprosed as a substitute for opium by Dr. Cox, of Philadelphia; but its value as a narcotic has been more lately examined by Dr. Duncan, senior, who conceives it to be particularly well adapted for allaying the cough in phthisis pulmonalis; and his opinions have been confirmed by the experience of many other respectable practitioners. The hypnotic influence of lettuce was known to Dioscoridis, and Galden proved its efficacy in his own person, and eat a lettuce every night to procure sleep. That of lactucarium has been well ascertained: and it undoubtedly proves useful as a soporific[1], where, from peculiar idiosyncracy, or other causes, opium cannot be taken. The dose is from gr. i. to grs. vj. in the form of a pill: or, of a tincture made with one ounce of lactucarium and a pint of diluted alcohol, from ten to sixty drops may be taken.

Officinal preparation.—*Succus spissatus Lactucæ sativæ*, E.

2. LACTUCA VIROSA.[2]

Officinal. LACTUCÆ VIROSÆ HERBA, *Edin. Dub.* Strong-scented Lettuce-leaves.

Syn. Laitue vireuse (*F.*), Wilder lattich (*G.*), Stinkende salade (*Dutch*), Stinkende laktuk (*Dan.*), Lattuca Salvatica (*I.*), Alface brava (*Portug.*).

This is an indigenous biennial plant, found growing on the banks of ditches and borders of fields, flowering in July and August. The stalk rises about three feet in height, erect, slender, prickly below, smooth above, round, panicled, and not very leafy. The leaves are rather smooth and toothed, the lower ones numerous, obovate, undivided; those of the stem smaller, often lobed, amplexicaule, with the midrib beset with prickles on the under side. The bractes are cordate and pointed. The flowers are numerous, compound, of a sulphur yellow colour, on short peduncles, furnished with small scaly leaves, and one at the base of each. The calyx is oblong, and composed of small lanceolate scales; and the corolla consists of florets scarcely longer than the calyx. The seeds are

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1 I have always found that when I eat lettuce to supper it acts as a soporific.
2 Θρίδαξ ἀγρία Dioscoridis.

elliptical, compressed, striated, black, and furnished with a stipitate, scabrous pappus.

The leaves and stem contain a white opaque juice under the cuticle, that abounds more copiously when the plant is in flower; at which time, therefore, they should be gathered, and the juice immediately expressed.

Qualities.—The odour of the leaves is heavy and fetid, resembling in some degree that of opium; their taste is bitter and acrid: qualities depending on their milky juice.

Medical properties and uses.—The expressed juice is narcotic and diuretic (see *Preparations* and *Compositions*). Dr. Schelinger of Frankfort has found it useful in angina pectoris[1]; and Dr. Toel has used it in combination with foxglove in hydrothorax accompanying disease of the heart.[2] The leaves themselves are not used.

Officinal preparation.—*Succus spissatus Lactucæ virosæ*, E.

LAURUS. *Spec. Plant. Willd.* ii. 477.

Cl. 9. *Ord.* 1. Enneandria Monogynia. *Nat. ord.* Laurineæ.

G. 798. *Calyx* none. *Corolla* calycine, six parted. *Nectary* of three two-bristled glands, surrounding the germen. *Filaments* interior, glanduliferous. *Drupe* one-seeded.

Sp. 1. L. *Cinnamomum.* The Cinnamon-tree. *Mat. Med. 3d edit.* 670. *t.* 223. *Percival's Account of Ceylon*, 4*to.* 346—350.

Sp. 2. L. *Cassia.* The Cassia-tree. Carua, *Rheede, Hort. Malabar*, i. *p.* 107. *t.* 59. *Herb. Amb.* ii. 65. *t.* 14.

Sp. 3. L. *Camphora.* The Camphor Laurel. *Mat. Med. 3d edit.* 681. *t.* 236. Michaux, *North American Sylva*, vol. i. pl. 83.

Sp. 10. L. *nobilis.* Common Sweet Bay. *Med. Bot. 3d edit.* 678. *t.* 235.

Sp. 34. L. *Sassafras.* Sassafras Laurel. *Med. Bot. 3d edit. t.* 234. *North American Sylva*, vol. ii. fol. 61.

1. LAURUS CINNAMOMUM.[3]

Officinal. CINNAMOMI CORTEX, *Edin.* CINNAMOMI OLEUM, *Lond.* LAURI CINNAMOMI CORTEX, *Edin.* CINNAMOMUM; CORTEX, OLEUM VOLATILE, *Dub.* Cinnamon, and Oil of Cinnamon.

Syn. Canelle (*F.*), Kanohl (*G.*), Kaneel (*D.*), Caneel (*Dan.*), Ackta Canel (*Swed.*), Canella (*I.*), Canela (*S.*), Kûrûndū (*Cyng.*), Dârchinie (*H.*), Dárcasita (*San.*), Karruwa Puttay (*Tam.*), Canella vulgar (*Port.*), Kayu-manis (*Malay*), Darsini (*Arab.*).

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[1] *Journ. Gen. de Med.* t. xi. p. 232.

[2] *Journ. Univ. de Sci. Med.* t. 47. p. 127.

[3] Κιννάμωμον Dioscoridis. The Malays call cinnamon kayu-manis, which is sometimes pronounced as if it were written kaina-manis, which Mr. Marshall supposes to have been the original of the ancient Greek name kinnamomon, which, however, Scaliger (*Not. in Garz.*) derives from the Hebrew *kinamon.* Burman has withdrawn the cinnamons from the genus laurus, and constituted them a new genus, Cinnamomum; he named the above species C. *Zeylanicum.* Sprengel names it Persea *Cinnamomum; Syst. Veg.* ii. 263.

The cinnamon tree is a native of Ceylon[1], growing in great abundance in many parts of the island, particularly near Colombo. It also grows plentifully in Malabar, Cochin China, Sumatra, Tonquin, the eastern islands, and the Chinese province of Quangsi. It has been cultivated in the Brazils, Egypt, the isles of Bourbon and the Mauritius, Tobago, and other places. France is partly supplied from Guiana, where it was introduced in 1755. The soil in which it thrives best is nearly pure quartz sand. That of the cinnamon garden, near Colombo, was found by Dr. J. Davy to consist of 98·5 of siliceous sand, and 1·0 only of vegetable matter, in 100 parts. "The garden is nearly on a level with the lake of Colombo: its situation is sheltered; the climate is remarkably damp; showers are frequent, and the temperature is high and uncommonly equable."[2] Marshall informs us that beyond Negombo and Matura, the bark is never good, and that no plant varies more from soil, shade, and culture than the cinnamon. The tree seldom rises above thirty feet in height; has a slender branching trunk covered with a brown ash-coloured cuticle, which is often speckled with dark-green and light orange in the young shoots. From the root spring a number of suckers, which form a bush round the trunk. The leaves, which stand in opposite pairs on short, slightly channelled petioles, are from four to nine inches in length, oblong, pointed, tri or quinquenerved; when young, scarlet or pale liver-coloured, with yellow veins, but afterwards of a dark green colour on the upper disk, glaucous on the under; and have a spicy odour and a hot taste when rubbed and chewed. The flowers, which appear in January, are white or pale yellow and inodorous, in lax axillary and terminal panicles. The calyx is pubescent, with six deep divisions: the petals are oval, pointed, concave, and spreading, longer than the filaments, which are in ternaries, flattish, erect, and the three innermost glanduliferous at the base; and the anthers are double. The fruit is an oval or ovoid drupe, resembling a small acorn, adhering to the receptacle, with the apex depressed, and the pulp fleshy, enclosing a small nut. It has a terebinthine odour, and a taste not unlike that of the juniper berry.

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1 Notwithstanding the jealousy of the Dutch, the cinnamon-tree, long before the British obtained possession of Ceylon, was cultivated at the Isle of France, in several parts of India, Jamaica, and some other of the West India Islands. Mr. Miller first cultivated it in this country in 1768; and a plant of it has regularly flowered and ripened seed in the hot-house of the Bishop of Winchester, at Farnham, for several years past.

2 *Davy's Account of the Interior of Ceylon,* 4to. p. 39.

There are several varieties of the cinnamon tree known at Ceylon. Seba enumerates ten; but the four following only are said to be barked:—1. Honey, sharp, sweet, or royal cinnamon (*rase curundu*, in the language of the natives), which is the finest sort; 2. Snake cinnamon (*nai curundu*), similar to the first; 3. Camphorated cinnamon (*capura curundu*), so named from its having the odour of camphor, and the root yielding camphor by distillation; and 4. Bitter astringent cinnamon (*cahatte curundu*), which has smaller leaves than the former varieties.[1] The trees that grow in the valleys, in a white sandy soil, are fit to be barked when four or five years old; but those in a wet soil, or in shady places, require to be eight or nine years of age. The bark is good for nothing if the tree be older than eighteen years. The tree was formerly propagated by a species of pigeon, that ate the fruit, and voided the seed; but since the time of Falck, one of the Dutch governors, who, about the middle of the eighteenth century, raised it from berries sown in his garden, it has been regularly cultivated.

The barking, particularly in the vicinity of Negombo and Matura, commences early in May, and continues until late in October. The *chaliahs*, or people who perform it, are under native officers, called cinnamon *moodeliars*[2], who are answerable for the quantity barked. Branches of three years old are selected, and lopped off with a pruning-knife or bill-hook, called a *ketta*. To remove the bark, a longitudinal incision is made through it on both sides of the shoot, so that it can be gradually loosened, and taken off entire; the epidermis and green matter between it and the inner bark are carefully scraped off; so that the bark speedily dries, contracts, and rolls itself up, forming hollow cylinders. The bark is not, however, immediately scraped, but tied up in bundles, and allowed to remain for twenty-four hours, by which a fermentation is produced that facilitates the separation of the epidermis, which, with the green pulpy matter under it, is then carefully scraped off. The bark having now assumed the

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[1] The other sorts mentioned by Seba are:—Sandy cinnamon, *welle coronde*, which feels gritty when chewed; glutinous cinnamon, *sewel coronde;* insipid and inodorous cinnamon, *nicke coronde;* drum cinnamon, *dawel coronde*, so named because the natives make drums of the wood; prickly cinnamon, *catte coronde;* flowering cinnamon, *mael coronde*, the tree being always in bloom; and three-leaved cinnamon, *toupat coronde.*—*Phil. Trans.* xxxvi. 97—105.

[2] Under the moodeliars are inferior officers named *mohandrums* and *aratchays;* and, in 1811, General Maitland appointed a superior, who is named *maha-moodeliar.*

quilled form, the smaller pieces are put within the larger.[1] The cinnamon, when dry, is tied up in bundles of 30 lbs. weight, and carried to the government storehouse, where the quality is determined by inspection of the bundles. It was formerly chewed, and the surgeons who used to be thus employed had their mouths so excoriated as to be unable to continue the process longer than two days together; but tasting is now seldom had recourse to. It is now examined, however, very carefully, and divided into a first, a second, and a third sort. The last is rejected, and the two former only should be sent to Europe. The bark of large branches and that of very small are rejected: the first has a reddish brown hue, a rough surface, tastes disagreeably pungent, and feels gritty in the mouth: the second is of a light straw colour, is thin, has little aroma and as little taste. Both kinds are occasionally found in the market. The coarse kind, in particular, is sold under the name of cassia; although the greater part of the cassia of the shops comes from Canton.

Ceylon cinnamon is brought home in bags or bales, weighing 92 lbs. each[2]: and, in stowing it, black pepper is mixed with the bales to preserve the cinnamon. According to Mr. Marshall's account, the annual quantity of cinnamon sold at the East India Company's sales, taken on an average of eight years, up to 1810, is 318,258 lbs., at an average price of six shillings per pound.[3] But much cinnamon, of an inferior kind, reaches Europe through private merchants, particularly from China.

The *oil of cinnamon* is prepared by macerating the bark[4] in sea water for two days, then distilling with a slow fire, and separating the oil from the water with which it comes over. A light oil comes over, which swims on the water; and a heavy oil, which gradually sinks in it: the light oil soon

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1 Prior to the 15th century, all the cinnamon used in Europe was imported by the Arabs, and passed through the hands of the Venetians; after this the Portuguese became the sole importers, and continued to be so until 1645, when their trade was divided with the Dutch, who obtained entire possession of it in 1658, and were the principal cinnamon merchants until 1796, when Ceylon fell into the power of the British.

2 The bags are made of cloth of the cocoa-nut bark.

3 *Annals of Phil.*, vol. x. p. 358.

4 The bark of the roots yields an aromatic essential oil, denominated oil of camphor, which is used in Ceylon as a rubefacient in painful affections of the joints, and in sprains. Oil of cinnamon has always been dear. Alston says, that he saw the finest Oriental sold in Holland, in 1721, at 50 stivers the drachm, "or the common price of the pound of cinnamon at Amsterdam."—*Lect. on Mat. Med.* vol. ii. p. 7.

separates from the water; but the heavy falls down very slowly, requiring ten or more days for its complete separation. It is generally adulterated with alcohol or expressed oil. The water is kept for repeated distillations. Eighty pounds of recent cinnamon are required to procure two ounces and a half of oil; one part of which is light oil, and rather more than two parts heavy oil. Cinnamon which has been kept yields two ounces of light oil and five of heavy oil. Good cinnamon is sometimes intermixed with cinnamon from which the oil has been drawn, and with cassia. The former is detected by the weakness of its odour and taste; and the latter by its thickness, smooth fracture, and remarkably slimy taste.

Cinnamon from China is imported under the name of cassia. It is usually in single quills, which are thicker, rougher, denser, and break with a shorter fracture than the fine Ceylon cinnamon. It is thus readily distinguished, but the distinction is rendered more evident when it is made into infusion. The infusion of the fine cinnamon affords no blue tint on the addition of tincture of iodine; that of cassia becomes blue, owing to the cellular part, which contains fecula, being left on the bark.

Qualities.—Cinnamon has a very pleasant fragrant odour, and a pungent, aromatic, sweetish taste; and the pieces, when chewed, soften in the mouth. When it is very hot, without sweetness, and leaves a mawkish taste in the mouth, it is of an inferior quality. The best is rather pliable, but breaks in splinters; is as thin as paper, and of a light yellowish colour: thickness and a dark or brown colour are marks of inferiority. What is called Chinese cinnamon, or *cassia*, is darker coloured, rougher, denser, and breaks shorter. The taste is harsher, more pungent and ligneous, without the sweetness of the Ceylon cinnamon. The age of the tree influences much the character of the cinnamon: it should be five years old in dry places, and nine in moist and shady situations. The trees on elevated sandy situations, exposed to the direct rays of the sun, have the sweetest odour, and furnish the most valuable bark. These qualities depend on the *essential oil*, which may be separated by macerating the bark in alcohol, and distilling the tincture; in which process the oil does not rise with the spirit, but remains in the retort. From ℥ xvj. of the bark, Neumann obtained only two scruples and a half of oil.[1] It has a pale gold colour, is heavier than water, perfectly soluble in alcohol, and has the odour and taste of the cinnamon concentrated.

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[1] *Neumann's Chymistry*, ii. 188.

Medical properties and uses.—Cinnamon *bark* is astringent, cordial, and tonic. Hence it is found to be efficaceous in alvine fluxes, proceeding from a weakened and languid state of the intestines, atonic dyspepsia, and chronic nervous debility: and, when given in the form of watery infusion, it removes nausea, and checks vomiting. But the principal use of cinnamon is to cover the disagreeable taste of other remedies. The *oil* is a powerful stimulant and stomachic; and is used as such in cramps of the stomach, flatulent colic, hiccough, and nervous langours. It is sometimes inserted into the hollow of a decayed tooth to allay the pain of toothach.

The dose of the bark in powder is from grs. x. to ℈j.: that of the oil from ♏ j. to ♏ iij. on a lump of sugar, or rubbed down with sugar as an oleo-saccharum; or with yolk of egg and syrup, so as to form a mixture with water.

Officinal preparations.—*Aqua Cinnamomi,* L. E. D. *Spiritus Lavandulæ comp.* E. D. *Spiritus Ammoniæ arom.* L. D. *Spiritus Cinnamomi,* L. E. D. *Infusum Catechu compositum,* L. D. *Decoctum Hæmatoxyli,* D. *Tinctura Cinnamomi,* L. E. D. *Tinctura Cinnamomi comp.* L. *Tinctura Catechu,* L. E. D. *Tinctura Cardamomi composita,* L. D. *Tinctura Lavandulæ comp.* L. *Vinum Opii,* L. D. *Pulvis Cinnamomi compositus,* L. E. *Pulvis Aloës comp.* L. *Pulvis Cretæ comp.* L. E. D. *Pulvis Kino comp.* L. D.

2. LAURUS CASSIA.[1]

Officinal. LAURI CASSIÆ CORTEX; FLOS NONDUM EXPLICATUS, *Edin.* LAURUS CASSIA CORTEX, *Dub.* The bark and flower-buds of the Cassia-tree.

Syn. *Of the bark:*—Casse (*F.*), Casia (*G.*), Cannellina (*I.*), Louranga puttay (*Tam.*), Kayu manis (*Jav.*), Kayu legi (*Malay*), Sing Rowla (*Nepaul*), Seleckheh (*Arab.*), Tej (*H.*), Twacha (*San.*). *Of the buds:*—Fleur de la Cannelle (*F.*), Cassia Bloemen (*D.*), Tejpatka konpul (*H.*), Sirnāgāpoo (*Tam.*).

The cassia tree is a native of Malabar, Ceylon, Sumatra, and Java, and has been generally supposed to be rather a variety of the cinnamon than a distinct species of *laurus;* although Marsden's description of the plant[2], and Gærtner's of the fruit[3], afford some reason for thinking that it is properly marked as a different species. It rises fifty feet in height, and gives out, almost from the bottom, large, spreading, horizontal branches: the leaves are from four to six inches long, elliptical, narrow, pointed, entire, smooth, longitudinally nerved, of a

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1 Κασσία Dioscoridis. It is the Dawul Kurundu of the Cingalese, the Cannella Matto of the Portuguese, and the Wilde Canule of the Dutch.—*Marshall, Phil. Trans.* 1817.

2 *History of Sumatra,* 125.

3 *De Fructibus,* ii. 69. *t.* 92. If Gærtner be correct, the fruit of the cassia is depicted, instead of that of the cinnamon, in the plate of the cinnamon plant, in Woodville's Medical Botany.

deep green colour above, and pale grey beneath. The flowers are in axillary clusters, six together on slender flower-stalks: they are monopetalous, white, small, and divided into six stellated points. The fruit is an ovate, oblong, black berry, with a mucronated apex, standing in a bell-shaped, coriaceous, angled, unequally five or six toothed calyx: it contains a bitterish pulp, and when dried is insipid and inodorous.

Like the cinnamon, those trees which grow in a dry soil and high exposed situation yield a superior bark to those in a moist soil and shaded spot. The larger branches and the trunk are said to be the parts of the tree barked; and the cuticle only appears to be scraped off, the cellular integument being left, which, as the bark is taken from the larger branches, is thick, spongy, and full of a slimy mucus. This plant is never decorticated at Ceylon; but the cassia sent home from Ceylon is the bark of the thick branches of L. *cinnamomum*, and is merely a coarse cinnamon: indeed it is probable that no cassia bark is brought to Europe; that chiefly known as such is imported from China, and is the production of a variety of L. cinnamomum. Some cassia is furnished by Sumatra, but the tree yielding it is unknown. According to Mr. Marshall[1], the *Cassia-bud* of commerce is the hexagonal fleshy receptacle or cupuliform calyx of the seed of the L. *cinnamomum*, and not the L. *cassia*, as supposed by the Dublin College. They are not prepared at Ceylon, but come chiefly from China, through Calcutta, Madras, and Bombay.

Cassia is imported in chests, half-chests, and occasionally in quarter chests.

Qualities.—The odour of the bark termed cassia-bark is similar to that of cinnamon, but fainter; and the taste is more pungent, but less agreeable: appearing slimy when much chewed. It is of a cinnamon colour, in pieces more or less quilled, but the quills are not inserted in one another: they are about one tenth of an inch in thickness; which break with a short, close fracture, and show it to consist of two parts; the inner darker and of a fine texture, and the outer paler and somewhat spongy. When these are separated, the inner part has all the sensible qualities of real cinnamon, only more pungency, whilst the outer has scarcely either flavour or taste: and I am of opinion, that the allowing this cellular integument, from which the cinnamon is freed, to remain in the bark termed cassia, constitutes the chief cause of the

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[1] *Annals of Phil.* vol. x. p. 245.

difference between these two barks.[1] Cassia is easily distinguished from cinnamon by its infusion striking a blue colour, with tincture of iodine. *Cassia-buds* are the pedicellated calyx, embracing the germen, which is lenticular, paler than the calyx, and smooth on its surface. They have the same odour and taste as the cinnamon bark: are of a brown colour, and resemble a nail, with a round head, which gradually terminates in a point. Both the bark and the buds yield, in distillation with water, an essential oil, similar to that of cinnamon, on which their qualities depend.

Medical properties and uses.—Cassia bark and buds are stimulant cordials; and are used in the same cases, and in the same manner, as cinnamon bark.

Officinal preparation.—*Aqua Lauri Cassiæ distillata*, E.

3. LAURUS CAMPHORA.[2]

Officinal. CAMPHORA, *Lond. Edin. Dub.* Camphor.

Syn. Camphre (*F.*), Kampfer (*G.*), Canfora (*I.*), Alcanfor (*S.*), Cafoor (*Arab.*), Kaafur, or Capoor Barroos (*Malay*), Cafur (*H.*), Curfura (*San.*), Carpoorum (*Tam.*).

The species of laurel here designated is a native of North America, China, and Japan. It yields the camphor of commerce, but a kind of camphor comes from Sumatra, which is the production of the Dryobalanops *Camphora*, a tree belonging to a different order altogether from the laurel. The camphor laurel[3] rises to a considerable height, is much branched, and covered with a smooth greenish bark. The leaves, which stand on long foot-stalks, are acuminate at both extremities, entire, smooth, ribbed, of a pale yellowish green colour on the upper surface, alternate on the under, glaucous, and two or three inches in length. The flowers are small, white, pedicellated, in roundish close clusters, which terminate long, axillary peduncles. The corolla consists of six small ovate, unequal petals, enclosing a tuberculated, bristled nectary, which surrounds the germen; the filaments are shorter than the corolla, and support round anthers; the germen is roundish, with a simple style and obtuse stigma. The fruit, which resembles that of the cinnamon[4], is a red, oval berry,

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[1] The rejected or third sort of cinnamon prepared in Ceylon is imported into England, and sold as cassia.

[2] Tchang (*Chinese*).

[3] Specimens of it are common in our hothouses; but they rarely flower.

[4] Camphor is not the production of those plants merely from which that known in commerce is obtained, but has also been procured from the roots of the cinnamon, cassia, and sassafras laurels; from those of galangale, zedoary, ginger; and from cardamom seeds and long pepper. The essential oils of lavender, sage, thyme, peppermint, rosemary, and several other labiated plants,

seated in a small yellow cup, supported in pairs on a long peduncle.

The roots, wood, and leaves of this tree have a very strong odour of camphor; and, from the roots and smaller branches, it is obtained by sublimation. They are cut into chips, which are suspended in a net, within a kind of still or iron pot, the bottom of which is covered with water, and an earthen head fitted to it: heat is then applied, and the steam of the boiling water, penetrating the contents of the net, elevates the camphor into the capital, where it concretes on rice-straws, with which this part of the apparatus is lined.[1] These granules are next melted in a basin, cut into layers, which are placed alternately with earth, in a copper vessel, over which another is inverted and luted. The vessel is then placed on the fire, and the camphor sublimes and crystallizes. But, as we have already stated, the greater part of the camphor which is not brought to Europe is obtained in Sumatra, where the trees which yield it are cut and split, and the camphor, which is found concreted in the heart of them, is picked out, and washed in a ley of soap. Camphor is imported into this country in chests, drums, and casks; and is in small, granular friable masses, of a dirty white or greyish colour, very much resembling in appearance half-refined sugar. Sometimes it is brought in square loaves. It often contains earth and other impurities.[2]

Camphor was introduced into Europe by the Arabians. Formerly all the crude camphor brought to Europe was purified by the Venetians, and afterwards by the Dutch, who kept the art secret and long monopolized the business; but it is now practised to a considerable extent in this country. It is sublimed in glass vessels, after being mixed with one twentieth[3] of its weight of quicklime; and is afterwards fused, either "by increasing the heat suddenly when the sublimation is almost ended, without transferring the camphor to different vessels, or by melting the sublimed flowers in a

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yield it; and an artificial camphor is prepared by passing hydrochloric acid gas through oil of turpentine. The varieties of camphor thus obtained, however, differ in some respects from common camphor. The Shorea *robusta* of Roxburgh, *Car. Pl.* vol. iii. p. 212., is said to yield a very fine species of camphor.

[1] According to Kæmpfer, the process is carried on chiefly by the peasants of Satzuma.—*Amœn.* 779.

[2] Zea describes a variety of camphor which is procured in South America, from a tree, the botanical characters of which are not yet known; but which is termed *carratte* by the natives. The camphor exudes from the bark in the form of tears.

[3] The French process is one sixtieth.

vessel for that purpose."[1] Thus refined, it is in large round cakes, or basins, about two or three inches thick, concave on one side, convex on the other, and generally perforated.

Qualities.—Pure camphor has a strong, peculiar, fragrant, penetrating odour; and a bitter, pungent, aromatic taste. It is white, transparent, unctuous to the touch, and friable, breaking with a shining, foliated, or tabular fracture, which displays a crystalline texture; and although brittle, yet it is also, in some degree ductile, and therefore is not easily pulverized. It swims on water, its specific gravity being 0·988; and it is so volatile, that if it be not kept in well stopped vessels, it loses a very considerable proportion of its bulk and weight by evaporation, particularly in a moist atmosphere. It melts at a temperature of 288°, boils at 400°, and sublimes in close vessels, crystallizing unchanged in hexagonal plates.[2] It is readily ignited, and burns with a brilliant white flame, giving out much smoke. When triturated with water, very little is dissolved[3], although it communicates to the water its odour and pungency; but the addition of carbonic acid gas augments very much the solvent power of water over camphor. Alcohol, ether, the fixed and volatile oils, the sulphuric and nitric acids diluted, the hydrochloric, the strong acetic, and the fluoric acids, dissolve camphor, which is again separated unaltered from these solutions by the addition of much water. Concentrated sulphuric acid decomposes it, forming artificial tannin: and by repeatedly distilling it with nitric acid, it is converted into camphoric acid. Alkalies exert scarcely any action on camphor: it unites with, and converts into a soft tenacious mass, the hardest resinous substances. Camphor, when mixed with clay, and distilled in close vessels, is decomposed, and resolved into a volatile oil and charcoal; in the proportion, according to Bouillon La Grange, of 45·856 of the former, and 30·571 of the latter: thence, as a chymical compound, it appears to differ from the essential oils, only in containing a larger proportion of carbon. Liebeg states its constituents to be carbon 8·763, hydrogen 9·702, oxygen 8·535. According to Dr. Ure, it consists of 10 equivalents of carbon

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[1] *Aikin's Dictionary of Chymistry*, art. *Camphor*. Professor Robinson, who saw the process as it was conducted in Holland, says, that the camphor is in a liquid state in the subliming vessel.—*Black's Lectures*, ii. 351.

[2] Mr. W. Phillips says, that the native crystal of camphor is a flat octahedron. —*Paris's Pharmacologia*, 5th edit. vol. ii. p. 117.

[3] Cadet asserts, that one French pint of water dissolves about sixteen grains of camphor, which are again precipitated by pure potassa.—*Ann. de Chimie*, lxii. 132.

$=61{\cdot}20 + 1$ equivalent of oxygen $= 8 + 9$ equivalents of hydrogen $= 9 = 78{\cdot}20$.[1] According to Dumas, it is an oxide of camphine, pure essence of turpentine. I have formed camphor by passing a stream of oxygen gas through highly rectified oil of turpentine. Its real constituents, therefore, are 10 carbon $= 61{\cdot}2 + 8$ hydrogen $= 8 + 1$ oxygen $= 8 = 77{\cdot}2$.

Medical properties and uses.—Camphor is stimulant, narcotic, and diaphoretic; but its stimulant powers are very transitory, and followed by sedative effects. It acts chiefly on the nervous system: and, like sulphur, it transudes through the skin, and is exhaled by the lungs. The Arabians appear to have first used camphor as a medicine[2], and by them it was regarded as refrigerant; an opinion which, even in more recent times, has been the subject of much controversy. In moderate doses it operates as a cordial, increasing the heat of the body, and exhilarating; besides softening, and rendering the pulse fuller, and promoting diaphoresis: in larger doses, it allays irritation and spasm, abates pain, and induces sleep; but in immoderate doses camphor produces vomiting, vertigo, delirium, convulsions, and other deleterious effects.

As a stimulant, camphor is beneficially used in all fevers of the typhoid kind[3], cynanche maligna, malignant measles, confluent small-pox, and as an adjunct to bark and opium to check the progress of gangrene; and in spasmodic affections, as hysteria, epilepsy, chorea, asthma, and painful menstruation. Its narcotic and anodyne effects being produced with very little increase of pulse, it has been successfully employed for allaying pain and irritation even in some inflammatory diseases; as pneumonia, acute rheumatism, gonorrhœa, small-pox when attended with convulsions, gout, and in the delirium of mania, and inflammatory fevers. But in these cases its use should be preceded by evacuations; and the remedy itself combined with nitre, or antimonials: and in maniacal cases with opium.[4] Camphor is also given internally, to obviate the irritating effects of some other medicines, and to increase the activity of others; it lessens the irritating quality of mezereon, cantharides, the saline preparations of mercury, and drastic purgatives; it corrects the nauseating property

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[1] A stream of perfectly dry hydrochloric acid gas transmitted through recently distilled oil of turpentine, gradually converts it into a crystalline substance closely resembling camphor. *Ann. de Chim. et Phys.* t. 47. p. 225.

[2] They call it *Canfur* as well as *Caofoor.*—*Clusios Exot.* 245., quoted by *Alston.*

[3] Etmuller says, "remedium in febribus malignis sine Camphora est instar militis sine gladio."

[4] In some experiments upon dogs with camphor, M. Defermon found that contraction of the spleen takes place, producing a rugose appearance of its surface, and a movement throughout the whole viscus.

and prevents the irritation which squill is apt to produce on the coats of the bladder; and combined with senna it greatly aids its purgative power.

Camphor may be administered in the solid form; but, as in this state it is apt to occasion nausea, it is generally ordered in a state of minute division, suspended in fluids by means of mucilage or the yolk of eggs; sometimes by magnesia, which, assisting its division, and rendering it smooth as starch, admits of its combination with acids; and as several of the gum-resins, when triturated with it, form a soft uniform soluble mass, they also may be employed for diffusing it in water.[1] It may be advantageously united with ammonia, aromatics, opium, bark, and other tonics, in low fevers, and diseases of debility; with calomel, antimonials, digitalis, and neutral salts, in inflammatory diseases; with the fetid gums and other narcotics, in spasms and convulsive affections; and with squill and ipecacuanha, in pulmonary complaints.

As a local anodyne, camphor is used in frictions, dissolved in oils, alcohol, or acetic acid, for allaying rheumatic and muscular pains; and, with the addition of laudanum, we have found it of great efficacy when rubbed on the abdomen, in flatulent colic, dysentery, and inflammations of the viscera. In collyria it is useful in opthalmia; and dissolved in oil, as an injection, in ardor urinæ; and as an enema in the tenesmus occasioned by ascarides, or other irritations of the rectum.[2] A pill of camphor and opium, or a solution of camphor in oil of turpentine, put into the hollow of a carious tooth, affords almost immediate relief in toothach. Twenty or thirty grains of camphor, added to a common poultice and applied to the perineum, allays chordee in gonorrhœa.

The dose of camphor is from grs. ij. to ℈j., repeated at shorter or longer intervals according to the extent of the dose and the nature of the case. It may be rubbed up with mucilage and almond emulsion, so as to suspend it in water; or it may be readily suspended in milk; and these forms are preferable to that of pills or bolus. The bad effects of an overdose are most effectually obviated by opium.

Officinal preparations.—*Mistura Camphoræ*, L. D. *Emulsio camphorata*, E. *Spiritus Camphoræ*, E. D. *Tinctura Camphoræ*, L. D. *Tincturæ Camphoræ composita*, L. E. D. *Acidum aceticum camphoratum*, E. D. *Linimentum Camphoræ*, L. E. *Linimentum Camphoræ comp.* L. D. *Linimentum Hydrargyri comp.* L. *Linimentum Saponis*, L. E. D. *Linimentum Saponis cum Opio*, D. *Linimentum Terebinthinæ*, L.

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[1] *Murray's Syst. of Mat. Med. and Pharm.* ii. 157.

[2] In some constitutions it must be exhibited in this form with caution: "two scruples of it given to a woman in a glyster proved so irritating as to bring on pains resembling those of labour."—*Heberden, Med. Trans.* vol. i. p. 473.

4. LAURUS NOBILIS.[1]

Officinal. LAURI BACCÆ ET FOLIA, *Lond. Dub.* LAURI NOBILIS FOLIA; BACCÆ; OLEUM FIXUM, *Edin.* Laurel berries and leaves, and the fixed oil of the berries.[2]

Syn. Baies de Laurier (*F.*), Lorbeeren (*G.*), Bobek drzewo (*Pol.*), Bacchi di Lauro Riccio (*I.*), Bayas (*S.*).

This tree is a native of Italy and the south of Europe; but is cultivated in this country, and is not uncommon in our gardens, flowering in April and May. It is a handsome evergreen; and although it appears as a shrub in England, yet in its native soil and climate it rises twenty or thirty feet in height. The bark is smooth, and of a green olive colour. The leaves are lanceolate, about three inches long, and an inch and a half broad, on short petioles, smooth, entire, veined, often waved at the margin, of a firm texture, and a deep green colour. The flowers are male and female on different plants, in short racemes, and of an herbaceous or yellowish white colour. The corolla is divided, in both descriptions of flowers, into four oval segments. The berry is superior, of an oval shape, fleshy, and of a dark purple, almost black colour.

Laurel berries, and the oil which is obtained by boiling the berries in water, are imported from the Straights. The simple expressed oil is insipid.

Qualities.—Both the *leaves* and the *berries* have a sweet, fragrant odour, and an aromatic astringent taste; and the *oil*, which is of a yellowish green colour, has a stronger but similar odour and taste.

Medical properties and uses.—Bay leaves, berries, and oil, are narcotic and carminative. They were formerly given in coughs, flatulent colic, hysteria, and obstructed menstruation; but their internal use is now abandoned; and, as an external application, they are generally compounded with other stimulants.

5. LAURUS SASSAFRAS.

Officinal. SASSAFRAS, *Lond.* LAURA SASSAFRAS LIGNUM, RADIX, *Edin.* SASSAFRAS; LIGNUM, RADIX, ET OLEUM VOLATILE, *Dub.* The wood, root, and oil of Sassafras.

Syn. Sassafras (*F.*), Sassafras (*G.*), Sassofrasso (*I.*).

This species of laurel is a native of the southern parts of North America and Cochin China. It is cultivated in Jamaica; and withstands the cold of our climate so as to be frequently reared in gardens as an ornamental shrub. The flowers appear in May and June. In America the plant rises twenty,

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[1] Δαφνη Dioscoridis. [2] Δαφνιδες Dioscoridis.

Δαφνη

thirty, and even fifty feet in height, with the trunk about twelve inches in diameter, covered with a rough, furrowed, grey bark, and brownish towards the top. The leaves are of different shapes and sizes; some being oval, entire, and about four inches long and three broad; and others, the most numerous, lobed, about six inches long, and nearly as broad: they are of a lucid green colour, downy on the under surface, petiolate, and alternate. The flowers, which appear in spring, immediately under the leaves, before they begin to be evolved, are small, and produced in pendant panicles; and at the base of the pedicels are linear bractes. The corolla is divided into six narrow, convex, yellowish or greenish white segments, enclosing in the male flowers, nine stamens supporting yellow anthers. The hermaphrodite flowers, which are on a separate plant, have six stamens only, and a simple style. The berry, which is oval, and, when ripe, of a deep blue colour, is contained in a small red cup, supported on a peduncle from one to two inches in length.

The sassafras laurel was discovered by the Spaniards, immediately after their conquest of Florida, in 1538, under Ferdinand de Soto, and termed by them cinnamon-wood, on account of its odour.[1] It is imported in what are termed logs; which are straight and branched pieces, light, of a spongy texture, and covered with the thick, rough bark. The bark is separated, and the wood then cut into chips, as is also the root.

Qualities.—Sassafras wood, root, and bark, have a fragrant odour, and a sweetish aromatic taste. The wood is of a brownish white colour; and the bark ferruginous within, spongy, and divisible into layers. Their sensible qualities and virtues depend on an essential oil, which can be obtained separate by distilling the chips or the bark with water. It is very fragrant, hot, and penetrating to the taste, of a pale yellow colour, and heavier than water. Water extracts the virtues of sassafras partially: alcohol, completely; and, when the tincture is evaporated, it leaves an extract which contains the whole virtue of the plant.

Medical properties and uses.—Sassafras is a stimulating diaphoretic and diuretic. It has been employed in cases of scurvy, chronic rheumatism, gout, and in cutaneous affections. It was once regarded as serviceable in lues venerea, but it has no pretension whatever to the character of an antisyphilitic. Its effects are very uncertain; and even the diaphoresis which it is supposed to occasion, may rather be

[1] *Savary's Dictionary,* ii. l. 487.

ascribed to the guaiac, and other more powerful medicines, with which it is generally combined. An infusion of the chips, taken as tea, is a common domestic remedy in the above complaints; but I know instances in which it has been taken regularly every morning for a couple of years without any perceptible benefit. The infusion, however, is the best form of giving the remedy, as much of the oil is dissipated in making the decoction.[1] The oil is sometimes given with the same intentions as the infusion.[2]

Officinal preparations.—*Oleum Sassafras,* L. E. D. *Decoctum Sarsaparillæ compositum,* L. D. *Decoctum Guaiaci compositum,* L. E. D.

LAVANDULA. *Spec. Plant. Willd.* iii. 60.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.

G. 1099. *Calyx* ovate, somewhat toothed, supported by a bracte. *Corolla* resupine. *Stamens* within the tube.

Species 1. L. *Spica.* Lavender. *Med. Bot. 3d edit.* 221. *t.* 114.

Officinal. LAVANDULÆ FLORES[3], *Lond. Dub.* LAVANDULÆ SPICÆ FLORES, *Edin.* The flowers of Lavender.

Syn. Lavande (*F.*), Lavendelblumen (*G. Dutch, Dan. Swed.*), Lawanda (*Pol.*), Lavanda (*I.*), Alhuzema (*S.*), Alfazema (*Port.*).

The plant named by the Pharmacopœia is not that which is officinally employed. It is the L. *vera,* the narrow leaved species, which is cultivated, and used in this country. The L. *spica* is unknown, except in particular collections, in Great Britain. The L. *vera* is a perennial, a native of the south of Europe, but commonly cultivated in our gardens[4], flowering from June to September. It is a much branched shrub, rising in its proper soil often six feet in height; the woody part of the stem being covered with a rough brown bark, while that of the shoots, which are four-cornered, is of a pale glaucous colour. The leaves of the most common variety are glaucous, narrow, nearly linear, and entire: the lower petiolate, and the upper ones sessile. The flowers are produced on the young shoots in terminal spikes, which consist of interrupted whorls. The corolla is blue, tubular, and

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[1] Dr. Paris (*Pharmacologia*), has given the following formula, as that by which much of the nostrum called Godfrey's Cordial is prepared:—"Infuse ℥ix. of sassafras, and of the seeds of coriander, carraway, and anise, of each ℥j., in six pints of water: simmer the mixture until it is reduced to four pints: then add lbs. vj. of treacle, and boil the whole for a few minutes: when it is cold, add f℥iij. of tincture of opium."

[2] In Virginia a beer is made by boiling the young shoots of the sassafras in water, adding molasses to the decoction, and fermenting it. Soon after its introduction into Europe, M. Bremane (*Sassafralogia,* 1627,) informs us, it was sold for 50 livres per lb.

[3] Ιφυον Theophrasti.

[4] It was cultivated in England so early as 1568, according to Turner.

labiate: the upper lip larger and bifid: the lower divided into three segments. The filaments are within the tube, and support small simple anthers: the style, which is slender, and crowned with a bilobated stigma, rises from the centre of four naked seeds at the bottom of the tube.

The flowers are cut in dry weather, when they begin to blow.

Qualities.—Lavender-flowers have an agreeable, fragrant odour, and a warm, bitterish taste. Alcohol extracts their virtues completely, and elevates in distillation all their odorous parts: water acts less completely. The oil, however, on which their virtues depend, is obtained separate in distillation with water; in the proportion, according to Lewis[1], of one ounce of oil from sixty ounces of flowers.

Medical properties and uses.—Lavender is stimulant and tonic. The oil extracted by alcohol enters into several compositions. The dried leaves in powder were used formerly as a sternutatory; but they are now neglected.

Officinal preparations.—*Oleum Lavandulæ*, L. E. D. *Spiritus Lavandulæ*, E. D. *Tinctura Lavandulæ*, L. *Tinctura Lavandulæ composita*, L. E. D. *Pulvis Asari compositus*, D. E.

LEONTODON. *Spec. Plant. Willd.* iii. 1544.

Cl. 19. *Ord.* 1. Syngenesia Æqualis. *Nat. ord.* Compositæ.

G. 1407. *Receptacle* naked. *Calyx* double. *Pappus* stipitate, hairy.

Species 1. L. *Taraxacum.*[2] Dandelion. *Med. Bot. 3d edit.* 39. *t.* 16. *Smith, Flora Brit.* 822. *Eng. Bot.* 510.

Officinal. TARAXACUM, *Lond.* LEONTODI TARAXACI HERBA, RADIX, *Edin.* TARAXACUM; RADIX, HERBA, *Dub.* The root and leaves of common Dandelion.

Syn. Dent de Lion, Pissenlit (*F.*), Lowenzahn wurzel (*G.*), Paapenkriud (*Dutch*), Lövetand (*Dan.*,) Lejentand (*Swed.*), Papawa ziele (*Pol.*), Tarassaco (*I.*), Cardillos tagarnina (*S.*), Dente de Leão (*Port.*).

This is one of our most common indigenous plants, flowering from April to September. The root is fusiform, and externally of a dark colour. The leaves are all radical, in general runcinate, but in very moist situations nearly entire[3], toothed, smooth, and of a pleasant green colour. The flower-stem is an erect, one-flowered, simple scape, naked, smooth, fistulous, fragile, and abounding with a milky bitter juice. The flower is terminal, large, of a golden colour, and closes in the evening: the calyx is smooth, with the exterior scales loosely turned down: the florets are very numerous, ligulate, and toothed at the extremities. The receptacle is spheroidal

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[1] *Mat. Med.* 371.

[2] Αφακη Græcorum.

[3] It must be distinguished from *Leontodon palustre*, Marsh Dandelion.

and punctured. The seeds are obovate, furrowed, of a pale olive colour, and furnished with a radiated pappus, on a large stipe.

The herbaceous part of this plant is blanched, and used on the Continent as a salad; but, in this country, although it is designated by the Edinburgh and Dublin colleges, yet it is very seldom used, the root possessing much more of the principle on which the medicinal powers of the plant depend. The recent, full-grown root only should be used; and it should be raised in autumn. It is internally white, and covered with a brown cuticle.

Qualities.—Dandelion is inodorous, but has a bitter, somewhat sweetish acidulous taste. The milky juice reddens the vegetable blues, owing, according to Hermbstadt[1], to the presence of tartaric acid. Water extracts the juice better than alcohol; and scarcely any thing is taken up by ether; yet Dr. John detected caoutchouc in it. The decoction is precipitated by infusion of galls and solutions of nitrate of silver, bichloride of mercury, and acetate of lead. Sulphate of iron strikes with it a pale olive colour, and, after some time, throws down a precipitate. Hence it is probable, that the active principles of taraxacum are extractive, gluten, a bitter principle which does not appear to be resinous, and either free tartaric acid, or a bitartrate. The above-mentioned re-agents are incompatible with the decoction.

Medical properties and uses.—Dandelion is excitant, aperient and diuretic. It has been long used on the Continent as a remedy in jaundice, dropsy, hepatic obstructions, and some cutaneous diseases.[2] In this country it has been lately much prescribed; and, although its powers appear to have been over-rated by the German physicians, yet it certainly possesses some efficacy in these diseases; and Dr. Pemberton affirms that he has seen great advantage result from using the extract in chronic inflammation and incipient scirrhus of the liver, and in chronic derangements of the stomach.[3] Dr. W. Philip considers it well adapted for cases in which bile is deficient without an impaired state of stomach. Much depends on the nature of the preparation. It may be given in the form of extract, or of infusion made by boiling ℥ij. of the sliced root in Oij. of water down to a pint, and to the strained fluid adding ʒiij. of bitartrate of potassa: f℥ij. may be given for a dose three or four times a day.

Officinal preparations.—*Decoctum Taraxaci,* D. *Extractum Taraxaci,* L. D.

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[1] *Thomson's Chymistry,* 4th edit. v. 641.
[2] *Bergius, Mat. Med.* ii. 649.
[3] *Diseases of the Abdominal Viscera,* 42.

LICHEN.

Cl. 24. *Ord.* 5. Cryptogamia Algæ. *Nat. ord.* Lichenaceæ.
Generic Char. *Male.* Scattered warts.
———— *Female.* Smooth shields or tubercles, in which the seeds are embedded.
Species 1. C. *Islandica* [1], Iceland or Eringo-leaved Liverwort. *Eng. Bot.* 1330. *Flor. Danica*, 155. *Regnault, Observations on Pulmonary Consumption. Woodville's Med. Bot.* 3d *edit. p.* 803. *t.* 271.
Species 2. C. *Rocella.* Dyer's Lichen, or Orchall. *Eng. Bot.* 211.

1. CETRARIA ISLANDICA.

Officinal. CETRARIA, *Lond.* LICHEN ISLANDICUS, *Edin.* CETRARIA ISLANDICA, PLANTA, *Dub.* Iceland Liverwort.

Syn. Lichen d'Islande (*F.*), Isländisches moos (*G*), Yslandsch moos (*Dutch*), Islands moos (*Dan.*), Islands mossa (*Swed.*), Liquen Islandico (*S.*), Musgo Islandico (*Port.*), Lichene Islandico (*I.*).

This species of Lichen, or Cetraria, as it is now termed, is an indigenous perennial. It is very abundantly found in Iceland, and in the north of Germany; and is more or less common on all the heaths and mountains of the north of Europe.[2] It grows to the height of two or three inches only, and has a rugged, bushy aspect. The frond is dry, coriaceous, lobed, and laciniated, the lobes being subdivided and notched, resembling in appearance a buck's horn; but concave above, and convex beneath: their surface is smooth, shining, and blistered; the margins beset with short, very minute, rigid, parallel hairs: and the colour of the whole is greenish yellow, or greyish brown.

This plant is used in Iceland and Lapland as an article of diet; being boiled in broth or milk, after being freed from its bitter by repeated maceration in water; or dried and made into bread. It has of late years been brought in considerable quantity to this country for medicinal purposes.

Qualities.—The dried lichen differs very little in its appearance from the recent plant. It is inodorous, and has a bitter mucilaginous taste; is neither very tough nor very brittle, but is not easily pulverized. When macerated in water it absorbs more than its own weight of the fluid, and the blisters appear like little white, opaque glands, while the other parts of the plant are diaphanous. If the water employed in the maceration be warm, it acquires a strong bitter taste, very similar to that of an infusion of quassia. The macerated lichen boiled in water affords a yellow-coloured inodorous decoction, which thickens as it cools, and becomes

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[1] The Dublin College refers the plant to Cetraria *Islandica.*
[2] It grows abundantly in the Asturias.—*Journ. de Physique,* 1806.

a tremulous jelly resembling starch, but without any viscidity. After some time this jelly cracks, separates from the watery part, and dries into semi-transparent masses, which are not soluble in cold water, but soluble in boiling water; and from which it is again precipitated by infusion of galls. According to the analysis of Proust, 100 parts of lichen afford 64 parts of a substance insoluble in hot water, somewhat resembling vegetable gluten; 33 parts of a matter soluble in hot water, resembling starch: and three parts of a bitter extractive principle.[1] But according to Dr. John, the components are, inuline 8, mucilage 40, extractive 10, green resin 1·5, saline matter 4·5, and insoluble matter 37·5 parts. A more recent examination has been made by Berzelius, who procured three per cent. of bitter principle, which in its pure state is of a clear yellow colour, pulverulent, light, and intensely bitter. It is more soluble in alcohol than in water. The fecula of the lichen does not strike a blue colour with tincture of iodine: thence it is correctly supposed to be inuline.

Medical properties and uses.—Iceland liverwort is tonic and demulcent. From some remarks of Linnæus, made in 1737 in the Flora Lapponica, it would appear that the Danish physicians had long before that time employed this lichen, and found it efficacious in hæmoptysis, and pulmonary complaints; but it did not excite the attention of even the continental physicians till after Scopoli's observations on it, in 1769, were published; and very few years have passed since it was known as a remedy in this country. Its virtues for the cure of phthisis have been very highly extolled; but experience has not altogether confirmed the truth of the praises which have been lavished on it.[2] Its supposed specific effects are said to depend on the combination of its tonic, bitter, and its demulcent properties. As a demulcent it is certainly superior to the mucilages; and, owing to the bitter principle it contains, its decoction affords all the good effects that can be obtained from the other demulcents, and the mucilages, without loading the stomach. It allays the tickling cough, and relieves the oppressed breathing; involves the acrid matters contained in the stomach and bowels which often induce diarrhœa; and renders more bland the whole mass of animal fluids, so as to mitigate hectic fever, while, at the same time, it tends to invigorate the digestive organs. Still, however, its efficacy in phthisis is very circumscribed; but the circumstances above enumerated ought not to be overlooked, nor

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[1] *Journ. de Physique*, 1806.

[2] It still possesses a high reputation as a remedy for phthisis by the natives of Iceland.—*Mackenzie's Travels*, 4to. *Appendix*, p. 411.

the Iceland lichen regarded, as it often is, as a demulcent not more worthy of notice than the other articles of the same class. Besides phthisis, it has been also found useful in debilities after acute diseases, and in emaciations, particularly those arising from the great discharge of ulcers; in diarrhœas, dysentery, and hooping-cough.

It is generally exhibited in the form of decoction (see *Preparations and Compositions*); but as the bitter proves hurtful where the lungs or other viscera are actively inflamed, that ingredient must be therefore partly separated. This is effected by cutting or pounding the lichen, macerating it in several waters, and then, after boiling it for ten minutes, and decanting off the water, boiling it to the form of a mucilage in a fresh portion of water.

Officinal preparations.—*Decoctum Cetrariæ*, L. *Decoctum Lichenis Islandici*, D.

LINUM.[1] *Spec. Plant. Willd.* i. 1533.

Cl. 5. *Ord.* 5. Pentandria Pentagynia. *Nat. ord.* Linaceæ.

G. 590. *Calyx* five-leaved. *Petals* five. *Capsule* five-valved and ten-celled. *Seed* solitary.

* *With alternate leaves.*

Species 1. L. *usitatissimum.* Common Flax. *Med. Bot.* 3*d edit.* 566. *t.* 202. *Smith, Flora Brit.* 342. *Curtis Lond. fasc.* 5. *t.* 22.

** *With opposite leaves.*

Species 26. L. *catharticum.* Purging Flax. *Smith, Flora Brit.* 344. *Eng. Bot.* 382.

1. LINUM USITATISSIMUM.

Officinal. LINI OLEUM ET SEMINA, *Lond.* LINI USITATISSIMI SEMINA, *Edin.* LINUM; SEMINA, OLEUM EX SEMINIBUS EXPRESSUM, *Dub.* Linseed, and Linseed oil.

Syn. Grains de Lin (*F.*), Leinsaamen, Flachsaamen (*G.*), Vlasch (*Dutch*), Hör (*Dan.*), Lin (*Swed.*), Len (*Pol.*), Alleverei (*Tam.*), Tokhemtukan (*Pers.*), Bidgierammu (*Malay*), Semi di Lino (*I.*), Laxor (*S.*), Linhaca (*Port.*), Buzruk (*Arab.*), Tisi (*H.*), Atasci (*San.*).

The common flax is an annual plant, flowering in July. It is supposed to have been originally brought from those parts of Egypt which are annually inundated by the rising of the Nile; but it is now found growing wild in this country, and is cultivated in most parts of Europe. The root is simple and fibrous. The stem is erect, round, smooth, slender, and leafy; branched, with a pannicle at the summit, and rising about two feet in height. The leaves are small, lanceolate, entire, obscurely three-nerved, smooth, sessile, standing nearly upright, and alternate on both the stem and branches. The flowers are petiolate: the calyx persistent, composed of five

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[1] Λινον Dioscoridis.

sharp-pointed, keeled, trinerved, ovate leaflets; and the corolla consists of five notched, oblong, sky-blue, streaked petals, which spread into funnel-formed blossoms. The filaments are white, dilated, and slightly united at the base; the germen is ovate, and crowned with five blue, thread-like, spreading, reflected stigmas. The capsule is globular, the size of a common pea, crowned with a sharp spine, formed by the junction of the spines of the valves in one point, and containing in each cell an elliptical shining seed.[1]

Although this plant is extensively cultivated in Britain, yet the greater part of the linseed used here is brought from the Baltic. The seed ripens in September, and the plant is then pulled up as soon as the heads begin to change brown and hang downward, otherwise the seeds are soon scattered.

Qualities.—These seeds are inodorous, and have an oily, mucilaginous, sweetish taste. They are small, flat, oval, and covered with a smooth, shining, brown-coloured cuticle, which abounds with a mucus, that can be extracted pure by infusion in boiling water. By expression, they yield one sixth of their weight of fixed oil. The mucus of linseed is colourless, insipid, inodorous, and resembles in its viscidity mucilage of acacia gum; but differs from it in the following particulars:—alcohol precipitates it in white flocks, but the liquid remains clear: acetate of lead throws down a dense precipitate, but persulphate of iron and silicated potassa produce no sensible effect. Nitric acid converts it into mucic acid. Guerin found linseed mucilage to contain both a soluble and an insoluble principle: the former resembles pure gum, the latter differing from both cerasin and bassorin.[2] For the qualities of the oil, see *Preparations.* It exists in the cotyledons.

Medical properties and uses.—Linseed is emollient and demulcent. The mucus obtained by infusion is a cheap and very useful demulcent in catarrh, pneumonia, diarrhœa, and dysentery; visceral inflammations, calculus, gonorrhœa, ardor urinæ; and during the exhibition of bichloride of mercury. When the seeds are boiled in water, the mucus is obtained in union with a portion of the oil; forming a useful local remedy when given in the form of enema in abrasions of the intes-

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[1] The partitions of the cells are singular. Gærtner thus describes them:—"Dissepimenta membranacea, conduplicata, laminis suis extrorsum partitis, ita valvularum marginibus inserta, ut, cum hæ dehiscunt illæ corii follis adinstar explicentur:" and adds, "Dissepimentorum in radiola atque lino fabrica, hactenus sine pari est, et essentialem hujus generis præbet characterem."—*De Fructibus*, ii. 147.

[2] *Ann. de Chim. et Phys.* xlix. 203.

tines and tenesmus, particularly in the advanced stage of puerperal fever, when the offending matter in the bowels stimulates to frequent and involuntary stools: but the portion thrown up must be small in quantity.[1] The seeds, ground into powder or meal, and simply mixed with boiling water, form an excellent poultice; valuable on account of the facility with which it is made.

Officinal preparations.—*Infusum Lini compositum*, L. D. *Oleum Lini*, E. D. *Pulvis pro Cataplasmata*, D.

2. LINUM CATHARTICUM.[2]

Officinal. LINUM CATHARTICUM, *Dub.* Purging Flax.

Syn. Lin purgatif (*F.*), Purgier Flachs (*G.*), Purgeervlasch (*Dutch*), Liden Vildhör (*Dan.*), Villhör (*Swed.*), Lino purgativo (*I.*), Cantilagua (*S.*), Linho purgante (*Portug.*).

This is an indigenous annual plant, found on dry and hilly pastures, flowering from June to August. The root is small, and sends up several delicate, leafy, erect, smooth stems, simple at the base, but dichotomous above, many flowered, and from three to nine inches high. The leaves are opposite, of a sub-elliptical, lanceolate shape, obtuse, entire, green on the upper surface, and glaucous beneath. The flowers are small and white; nodding before they open, after which they rise and stand erect. The leaves of the calyx are pointed, serrated, and one-nerved; in the corolla, the petals are obovate, acute, white, and spreading; the filaments are united, forming a circle round the lower part of the germen, which is furnished with capitate stigmas. The seeds are yellow and shining.

Qualities.—Purging flax, whether in the recent state or the dried, is nearly inodorous, and has a bitter, sub-acrid taste. Water extracts the virtues of the plant, which communicates to it, besides its sensible qualities, a yellow colour. Macerated in ether, it affords a green tincture, which deposits, when it is evaporated on the surface of water, a green bitter resin, and an extractive matter, on which the virtues of the plant seem to depend.

Medical properties and uses.—This species of flax was celebrated as a purgative by Gerarde. It may be given in the form of infusion, made with ʒ ij. of the dried plant, and Oj. of boiling water, of which f ℥ij. is a dose: of the dried plant in powder, ʒj. may be taken for a dose. But it possesses no particular advantages, and only swells unnecessarily the list of purgatives.

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[1] *Denman's Midwifery*, ii. 251.

[2] *Λινοκάρπος* Græcorum.

LOBELIA. *Willd. Sp. Plant.* i. 937.
Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Lobeliaceæ.
G. 342. *Calyx* five cleft. *Corolla* one irregular petal. *Anthers* cohering. *Capsule* inferior, two or three-celled.
Species 29. L. *inflata.* Inflated Lobelia, Indian Tobacco. *Barton. Med. Bot.* i. 181. *Bigelow's American Botany,* i. 177.

This species of Lobelia is a native of the United States of America, growing as a common weed on the road sides, and in waste places. It flowers from July to October. It is an annual plant, with a fibrous root, and a solitary, erect, angular, hairy stem, about a foot high, branching above its mid height. The leaves are sessile, oval, acuminate and serrated. The flowers are numerous, in terminal racemes, axillary, and supported on short pedicels: the segments of the calyx are linear and pointed; the corolla has a labiate border, with upper lip bifid, the lower trifid; and the curved tube of anthers incloses the stigma. The fruit is an oval, inflated, striated capsule, crowned with the persistent calyx, and containing in two cells numerous small, brown, seeds.

The plant should be gathered in August, when it is turgid with a white, opaque juice; should be carefully dried, and kept in the entire state in well-stopped bottles.

Qualities.—Lobelia inflata, in the state in which it is employed, has a slight odour; and, when much chewed, it imparts an acrid impression to the posterior part of the tongue and the palate, and causes a flow of saliva, and nausea. It yields its properties to water, alcohol, and ether. The watery infusion affords precipitates with hydrochlorate of tin, sulphate of iron, and lime-water, demonstrating the presence of extractive and tannin in it: but what are the other principles it contains is yet unknown, as it has not been analysed. The powder is of a greenish colour.

Medical properties and uses.—Lobelia is emetic, purgative, and in small doses diaphoretic, expectorant, and antispasmodic. When the leaves are chewed they cause vertigo, headache, tremors, nausea, and vomiting; and few medicines are followed by such debilitating effects. In large doses it operates as a powerful narcotic poison, resembling tobacco in the symptoms, and most hazardous when it does not vomit.

Lobelia was long employed by the Indians: it was introduced to the notice of the profession by the Rev. Dr. Cutler of Massachusetts. It has been chiefly employed in asthma; and is undoubtedly useful when administered during the paroxysm: but I have never observed any advantage result from its employment during the intervals. Mr. Gordon of Wilton found it very useful in that species of the disease which has been termed May asthma. It has also been used, successfully, in croup, hooping-cough, and other affections of the lungs; but in these it is less beneficial than in asthma. D. Eberle, from observing the similarity of its action to that of tobacco, employed it in the form of enema in strangulated hernia; and he found its effects in every respect similar to those of that narcotic.

Lobelia inflata is administered in the form of powder, in doses from four to twenty grains; in infusion made with ℥ j. of the plant, and Oss. of boiling water, of which an ounce may be administered every half hour until nausea be induced: and also in the form of tincture, made with ℥ iv. of the dried plant, and Oij. of proof spirit, of which from ♏ xv. to ♏ xxx. may be given in the same manner as the infusion.

LYTHRUM. *Spec. Plant. Willd.* ii. 865.

Cl. 11. *Ord.* 1. Dodecandria Monogynia. *Nat. ord.* Lythraceæ.
G. 951. *Calyx* twelve-toothed. *Petals* six, inserted into the calyx. *Capsule* two-celled, with many seeds.
Species 1. L. *Salicaria.*[1] Loosestrife, or Purple Willow Herb. *Med. Bot.* 2d *edit.* *Smith, Flora Brit.* 510. *Eng. Bot.* 1061.
Officinal. LYTHRUM SALICARIA; HERBA, *Dub.* Loosestrife.

Syn. Salicaire (*F.*), Brauner Wiederich (*G.*), Partike (*Dutch*), Salicaria (*I.*).

This is an indigenous, perennial plant, found wild in almost every part of Europe, in marshes, and on the banks of rivers, flowering from July till September. It is an elegant plant. The root is woody, branched, and extended; sending up an erect, leafy, slender, reddish, downy stem, about three feet in height, quadrangular, and sometimes hexagonous. The leaves are opposite, sessile, lanceolate, and cordate at the base; smooth on the upper surface, but pubescent beneath, and at the margin. The flowers are in the axillæ of the leaves, forming a leafy spike of a verticilated aspect: the calyx is red, hairy, and the segments of different shapes; six being awl-shaped and erect, and six small, ovate, concave, and bent inwards; the petals are oblong, undulated, and of a purple colour. The stamens are alternately longer and inflected. The capsule is elliptical and small.

Qualities.—Loosestrife, in the dried state, is inodorous, and has an herbaceous, sub-astringent taste. In coction with water, it renders the fluid mucilaginous; and the decoction strikes a black colour with sulphate of iron.

Medical properties and uses.—This plant is astringent and tonic. It is recommended by De Haen, and has long been celebrated in Ireland as a remedy in diarrhœa: it has also

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[1] Λυθρον Dioscoridis. This species of Lythrum is the only species of the order Lythraceæ yet found in New Holland.

been found useful in dysentery. It is always proper to give a purgative prior to its use being begun. The best form of giving it is that of decoction, made by boiling ℥j. of the recent root with Oj. of water. The dose of the dried herb, in powder, is from ʒ ss. to ℈iv., that of the decoction of the root f℥j., repeated every third hour.

MAGNESIÆ SULPHAS, *Lond. Dub.* SULPHAS MAGNESIÆ, *Edin.* Sulphate of Magnesia. Bitter purging Salt.

Syn. Sulphate de Magnésie (*F.*), Schwefelsaure Magnesia (*G.*), Englesk laxeersali (*Dan.*), Sale amaro, Ossisolfato di Magnesia (*I.*), Sal Amargo (*S.*), Sal Cathartico amargo (*Portug.*).

This salt is found native in a pure state[1]; but it is more commonly combined with gypsum[2] and other salts, and in solution in sea-water, and several mineral springs. It was first artificially obtained in England in 1675, by Dr. Grew, from the evaporation of the water of the Epsom spring: whence it was named Epsom salt: and in 1700 it was made in considerable quantity from two springs at Shooter's hill in Kent[3]; but the discovery of it in bittern, or the residual brine after the crystallization of sea-salt, soon opened a more copious source from which it might be obtained at all times; and, for many years past, a great part of the sulphate of magnesia used in this country has been manufactured from bittern. This substance consists chiefly of hydrochlorate of magnesia, hydrochlorate of lime, some common salt, and a small portion of sulphate of lime; and, therefore, it is probable, that the sulphate of magnesia is obtained by decomposing the hydrochlorate by means of sulphate of iron, or sulphuric acid in some form, although some affirm that the bittern is only boiled down to a high point of concentration, when the sulphate of magnesia forms, and is purified by a second solution and crystallization. Much of the sulphate of magnesia, however, now sold, is prepared from magnesian limestone, Dolomite[4], by a process invented by Dr. Henry of Manchester: the Dolomite is first calcined, then treated with hydrochloric acid, which takes up the lime and leaves the magnesia, which is then con-

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1 In the mercury mines of Idria it is found crystallized, and named by the Germans *Haarsalz.* According to Klaproth, it contains 1 per cent. of oxide of iron. *Analyt. Ess.* 80. It also abounds in the great caverns in the Allighany mountains, in the United States of America.

2 It is found in the gypsum quarries of Piedmont; and, as Proust relates, it abounds so much in Spain, that in Andalusia large tracts are covered with an efflorescence of it after floods. *Journ. de Physique,* xxxiii. 312.

3 It is also made in Bohemia from the mineral water of Seidlitz.

4 In the neighbourhood of Genoa it is prepared by roasting a schistose rock which contains magnesia and sulphuret of iron; and then exposing it to the air under a shade for six months, occasionally watering it, and then lixiviating. Near Baltimore it is made by pulverizing a siliceous hydrate of lime, which abounds there, and saturating it with sulphuric acid.

verted into the sulphate. As it contains no hydrochlorate of magnesia, it attracts no moisture from the atmosphere, and does not deliquesce, as that prepared from bittern. This sulphate is sometimes adulterated with Glauber salt, which is made to resemble Epsom salt, by stirring it briskly when it is about to crystallize. It may be detected by precipitating the magnesia by pure ammonia, aided by heat; filtering, and evaporating the filtered fluid to dryness, by a heat sufficient to volatilize the sulphate of ammonia: if it contain Glauber salt, the soda will remain fixed.

Qualities.—Sulphate of magnesia is inodorous, and has a very bitter, nauseous, saline taste. It is usually in small needle-like quadrangular crystals, but the form of its larger crystals is a hexangular prism, acuminated by six planes. When pure, it effloresces; and is soluble in its own weight of water at 60°, increasing the volume of the fluid rather more than 4-tenths, or a solution of ℥j. of sulphate of magnesia in f ℥j. of water measures eleven fluid drachms and a quarter. Heat expels its water of crystallization; and the mass is melted, but not decomposed: it loses merely its water, and a minute portion of its acid. According to Dr. Henry, the composition of this sulphate is acid 38, magnesia 18, and water 44 parts, in 100 of the salt. Mr. Phillips (*Translation of the Pharmacopœia*) states the components to be sulphuric acid 32·52, magnesia 16·26, water 51·22: or we may regard them as 1 equiv. of magnesia$=$20·7 + 1 of acid$=$40·1 + 7 of water$=$63, making the equivalent of the salt 123·8. Its specific gravity is 1·66. It is decomposed by the alkalies and their carbonates, by lime-water, the hydrochlorates of ammonia, of baryta, and lime, nitrate of silver, and the acetates of lead, which are therefore incompatible with it in prescriptions: but it is not precipitated by the sesquicarbonate of ammonia.

Medical properties and uses.—This salt is purgative and diuretic. It operates readily, without griping; and, notwithstanding its nauseous taste, is generally retained by the stomach when almost all other things are rejected, especially when it is administered in small, repeated doses, largely diluted, or united with acidulated infusion of roses. In these forms it is a useful purgative in hypochondriasis, colica pictonum, ileus, puerperal fever, and in all acute diseases. In small doses, combined with compound spirit of ammonia, and dissolved in the infusion of quassia or gentian, it has been found very useful in dyspepsia accompanied with costiveness. It is also used as an adjunct to stimulating clysters. By moderate exercise in the open air while taking this salt, the purgative effect is diminished, and its diuretic property increased. The dose is from ʒss. to ℥ij. dissolved in water, gruel, or any other vehicle; and taken either at once, or in divided doses frequently repeated.

Officinal preparations.—*Enema Catharticum*, D. *Enema fœtidum*, D. *Magnesiæ Carbonas*, L. E. D.

MALVA. *Spec. Plant. Willd.* iii. 774.

Cl. 16. *Ord.* 6. Monadelphia Polyandria. *Nat. ord.* Malvaceæ.

G. 1290. *Calyx* double, the exterior three-leaved. *Capsules* numerous, one-seeded.

** *With angular leaves.*

Species 43. Malva *sylvestris.*[1] Common Mallow. *Med. Bot. 2d edit.* 554. *t.* 199. *Smith, Flora Brit.* 740. *Eng. Bot.* 671.

Officinal. MALVA, *Lond.* MALVÆ SYLVESTRIS HERBA, FLORES, *Edin.* Mallow.

Syn. Mauve (*F.*), Kasepappel (*G.*), Malva (*I.*), Malvas (*S.*).

This is a perennial, indigenous plant, common over all Europe, growing on waste grounds and at the sides of roads; and flowering from May till August. The root is fusiform, branching, and of a whitish colour. The stem frequently erect, branched, round, hairy, and many flowered. The leaves are alternate, petiolate, cordate, divided into seven lobes, plaited, somewhat rough, and crenate; the upper ones are almost palmate. At the base of each footstalk are two stipules. The flowers, which stand on slender, hairy peduncles, are large; composed of five, inversely cordate, purple petals, three times longer than the calyx, which is hispid. The capsules are from ten to fifteen in number, of a rounded kidney-form, crustaceous, brittle, close all round, of a dark straw-colour, excavated, and wrinkled on the back. The seeds are kidney-shaped, ash-coloured, and furnished with an arillus which opens inwardly.

Qualities.—Common mallow is inodorous, and has a weak, herbaceous, mucilaginous taste. The decoction has a mawkish, disagreeable taste; is precipitated by acetate of lead; and is little more than a simple solution of vegetable mucus.

Medical properties and uses.—This herb is more demulcent and emollient than the root. Its decoction is employed in dysentery, ischuria, strangury, and nephritic complaints, but is in every respect inferior to that of althea root. It is chiefly used in the form of enema in tenesmus and nephritic colic: and in that of cataplasms and fomentations in phlegmonous inflammation.

Officinal preparation.—*Decoctum Malvæ compositum*, L.

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[1] Μαλαχη Græcorum. Malva, quasi molva, quod alvum moliat.

MANGANESIUM. Manganese.

This is a brittle, greyish white, brilliant metal, somewhat resembling iron in its external aspect, of a granular texture, and not possessing ductility or malleability. It has not been discovered native in its metallic state[1], but its ores are found in most of the countries of Europe, both in primitive and transition mountains. It has neither odour nor taste; is softer than cast iron, and is not magnetic. Its specific gravity is 8·013.[2] It rapidly attracts oxygen from the air, loses its lustre, and progressively becomes violet, brown, and ultimately black. It rapidly decomposes water. It is very abundantly found in the state of the grey oxide. Manganese in the ore, both in primitive and transition mountains, is found

A. United with oxygen.

i. oxidized.	Sp. 1. *Grey manganese ore.* Var. *a.* Radiated. *b.* Foliated. *c.* Compact. *d.* Earthy.
	2. *Black manganese ore.*
— *a.* and combined with sulphur.	3. *Sulphuret of manganese.*
— *b.* ——— with phosphoric acid and iron.	4. *Phosphate of manganese.*
— *d.* ——— with silica and iron.	5. *Silicate of manganese.*

Of these species the first only has been introduced into the list of materia medica.

Officinal. MANGANESII BINOXYDUM, *Lond.* MANGANESII OXYDUM[3], *Dub.* Manganese, or more properly, Binoxide of Manganese.

Syn. Manganese (*F.*), Braunstein (*G.*), Manganese (*I. S.*).

Under the name of black or binoxide of manganese are implied all the varieties of the first species. It was discovered in England by Boyle, in the beginning of the 17th century, but was regarded as a modification of iron ore, till the separate experiments of Scheele and Bergman, published in 1774, proved it to be an oxide of a peculiar metal; which Gahn afterwards succeeded in obtaining in its metallic state, and to which he gave the name of Manganesium. It is found

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[1] La Perouse suspected that he had found manganese in a metallic state; but his opinion was not confirmed.

[2] John, vide *Gehlen's Journ.* iii. p. 460.

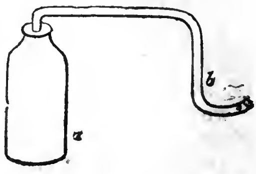
[3] This term is improperly used by the Dublin College: for although the black oxide was originally named *oxide of manganese,* and is still so named in commerce; yet, in a professedly scientific work, more accuracy of nomenclature is required. It ought to be Binoxydum.

in Great Britain, Germany, Switzerland, the north of Italy, and France.

The greater part of the binoxide of manganese used in England is obtained near Exeter in Devonshire, in Cornwall, and at Howth, near Dublin. The best is furnished by Upton mine, near Exeter. Good binoxide of manganese has lately been procured in Scotland. It occurs crystallized and amorphous; and is generally in combination with small portions of oxide of iron, carbonate of lime, silex, and barytes.

Qualities.—Binoxide of manganese differs in its external characters. It is seldom pure, being mixed with oxide of iron, carbonate of lime, and siliceous and aluminous earths. Its usual colour varies from iron-grey to black; when crystallized it is shining, but when amorphous devoid of lustre. It generally occurs massive; but sometimes its texture is radiated, or foliated, or in minute prisms grouped together. None of the varieties are very hard; all of them are brittle, and several of them soil the fingers. Their specific gravity varies from 3·5 to 4·7. One hundred parts of the binoxide consists of 71·23 of metallic manganese, and 28·67 of oxygen. Exposed to the heat of ignition, all the varieties afford oxygen gas; and, when mixed in powder with sulphuric acid, they afford it at a boiling temperature. It converts hydrochloric acid into chlorine[1]; the hydrogen of the hydrochloric acid is attracted by the oxygen of the binoxide of manganese, forming water, whilst the chlorine of the acid is evolved. It consists of 1 proportion of manganese = 27·7 + 2 proportions of oxygen = 16, making the equivalent = 43·7—Mn. + 2O.

Medical properties and uses.—This oxide is only used for procuring oxygen and chlorine gas; and for fumigation in cases of infection. To procure oxygen gas, a portion of the oxide, broken into small pieces, is put into an iron retort (*a*), fitted with a long curved tube (*b*), the extremity of which being placed under an inverted jar filled with water in a pneumatic trough, the retort is put into a common fire, and exposed to a full red heat. The caloric at this high temperature weakens the affinity between the manganese and the oxygen, with which it is united, and causing it to assume a gaseous state, the oxygen gas is transmitted through



1 The greatest consumption of Binoxide of manganese is for the formation of chlorine, as employed in the art of bleaching.

the water, and collected in the jar, leaving oxide of manganese in the retort. From the necessity of oxygen for carrying on the process of animal respiration, much benefit was expected from the breathing oxygen gas in disease; but experience has not confirmed the high expectations which were formed of its powers. It certainly increases the force and velocity of the pulse; and has been exhibited with seeming advantage in asthma, chlorosis, scrofula, typhoid fevers, and other diseases of debility. Diluted with from ten to twenty parts of atmospheric air, one or two quarts of it may be breathed at intervals in the course of the day.

But a more certain benefit is obtained from the use of this oxide of manganese in fumigations. Medicine is indebted to Morveau for the discovery of this mode of destroying infection; and the numerous instances in which it has proved beneficial have fully established its use. For a fumigation the following ingredients are required: dried common salt 50 parts, or ℥ivss., oxide of manganese in powder 44 parts, or ℥iij., sulphuric acid ℥xij., and water ℥vj.: the water and acid must be previously mixed together, and then, after the mixture is cold, poured over the other ingredients in a China or porcelain basin. The doors and windows of the room which is to be fumigated must be closely shut for two hours after the charged basin has been placed in it; then thrown open, and a current of air allowed to pass through the room. Chlorine is extricated by this process, and neutralizes the infectious and contagious matter floating in the atmosphere and attached to the walls and floors of the infected rooms. All metallic furniture should be previously removed. Chlorine, largely diluted, is now also employed in phthisis and asthma, inhaled into the lungs.

Officinal preparation.—*Aqua Chlorini,* D.

MANNA. Vide *Ornus Europæa.*

MARANTA. *Spec. Plant. Willd.* i. 13.

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Marantaceæ.

G. 10. *Calyx* three-leaved. *Corolla* trifid. *Nectary* three-parted, with the third superior lacinia anther-bearing.

Species 1. M. *arundinacea.* Arrow-root Plant. *Brown's Jamaica,* 112. *Loudon's Encyc. of Plants, p.* 2.

Officinal. MARANTA, *Lond.* The fecula of the rhizomes, Arrow-root.

Syn. Amerikanisches Starkmehl, Arrowmehl (*G.*).

This plant is a native of South America, the West Indies, and the southern states of North America: it has lately been introduced into Ceylon (*Ainslie*). The rhizome is perennial, tuberose, fleshy, horizontal, cylindrical, and furnished with long, white fibriles. The stems are annual, rising three feet in height, slender, jointed and branching, giving off at the joints alternate sheathing leaves about four inches long, ovato-lanceolate. The flowers are in loose terminal panicles, furnished at each ramification with a solitary, linear bracte. The calyx consists of three small, lanceolate sepals; the corolla is tubular, white, with the outermost segments small; the innermost are larger and slightly emarginate.

For preparing the arrow-root, the rhizomes are dug up when they are a year old, washed, beaten to a pulp, and agitated in water so as to separate the fibrous from the feculaceous part. The milky fluid is strained through coarse linen, and left at rest until the fecula subsides, when the supernatant fluid being decanted, the fecula is well washed with fresh portions of water, and dried in the sun.[1]

Qualities.—Arrow-root is a white, inodorous, insipid, light powder. It is a pure starch; forms a mucilage when it is boiled with water, which strikes a blue colour with iodine. A table-spoonful of the powder will form a pint of the mucilage. In making it, the powder should first be rubbed with a little cold water, then boiling water poured over it, with constant agitation, and the whole boiled for a few minutes. This mucilage is precipitated by astringent infusions and decoctions.

Medical properties and uses.—Arrow-root forms, when it is boiled with water or with milk, a mild, demulcent nutriment, well adapted for children, and for the sick and convalescent. The mucilage may be combined with lemon juice and sugar; or with wine, or beef tea, according to circumstances.

MARRUBIUM. *Spec. Plant. Willd.* iii. 109.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.

G. 1111. *Calyx* salver-shaped, rigid, ten-streaked. *Corolla*, upper lip bifid, linear, and straight.

* * *With ten-teethed calyces.*

Species 8. M. *vulgare.*[2] White Horehound. *Med. Bot. 2d edit.* 332. *t.* 118. *Smith, Flora Brit.* 636. *Eng. Bot.* 410.

Officinal. MARRUBIUM, *Lond.* MARRUBII VULGARIS HERBA, *Edin.* MARRUBIUM VULGARE, *Dub.* Horehound leaves.

Syn. Marrube blanc (*F.*), Weisser andorn (*G.*), Witte andoorn (*Dutch*), Ilvidmarru (*Dan.*), Andorn (*Swed.*), Szanta Biala (*Pol.*), Marrubio (*I.*), Marubio blanco (*S.*), Marroyo blanco (*Port.*).

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1 Maranta *Allonya* and *nobilis*; M. *Indica*, which, as its specific name implies, also furnishes West India arrow-root. The Curcuma *angustifolia* of Roxburgh supplies much of the East Indian arrow-root; and some has lately been brought from the Sandwich Islands, which is the production of the Tacca *pinnatifida*.

2 Πρασιον Dioscoridis. Lemery says the name is derived from the Hebrew word *Marrob*, which means a bitter juice.

White horehound is an indigenous, perennial plant, growing in waste grounds, and flowering in July. The root is fibrous, sending up numerous stems, about eighteen inches high, quadrangular, erect, and very downy. The leaves are in pairs, upon broad foot-stalks, rounded, crenate, wrinkled, hoary, and woolly on the under surface. The flowers are white, in crowded axillary whorls, sessile, villous, and furnished with setaceous, awned bractes. The calyx is tubular, furrowed, and divided at the margin into ten narrow segments, which are hooked at their points; the corolla is tubular, compressed, opening at the mouth into two lips, the upper of which is narrow and cloven; the under broader, reflected, and three-cleft, with the middle segment broad and scalloped. The filaments are two long and two short, with simple anthers, within the tube; and the style is slender, with a cloven stigma. The seeds are four, at the bottom of the calyx.

Qualities.—Horehound dried has an aromatic odour, which, however, is soon lost by keeping, and a durable bitter taste. Both water and alcohol extract its virtues. The infusion reddens tincture of litmus, gives a deep olive-green precipitate with sulphate of iron, a brown with nitre of silver, and a pale yellow with bichloride of mercury: acetate and diacetate of lead do not affect it. The active principles of horehound, therefore, appear to be a bitter extractive, volatile oil, and gallic acid.

Medical properties and uses.—Horehound is tonic, diuretic, and laxative. It was formerly much used in pulmonary affections, and is still a popular remedy for asthma and obstinate coughs. It loosens the belly when taken in large doses, and was consequently recommended in jaundice, cachexies, menstrual obstructions, and hysteria; and although its powers are not found by modern practitioners equal to the account which the ancients gave of them, and therefore it is very seldom prescribed, yet we have seen decided advantage from its exhibition in phthisis. The dried herb may be given in powder, in doses of from ʒss. to ʒj.; or of the expressed juice of the fresh plant from f ℥ ss. to f ℥jss. may be taken twice or thrice a day. It is also used in the form of infusion.

MEL. *Lond. Edin. Dub.* Honey.

Syn. Miel (*F.*), Gemeiner Honig (*G.*), Honning (*Dan.*), Honung (*Swed.*), Mel (*Russian*), Tayn (*Tam.*), Shahid (*Pers.*), Mele (*Ital.*), Miel (*S.*), Mel (*Port.*), Ussub (*Arab.*), Medhú (*H.* & *San.*), Komagun (*Bornouil*), Ammah (*Mandara*), Tejee (*Begharini*).

Honey is collected by bees from the nectaries[1] of flowers,

[1] The nectary is a glandular organ of the corollas of flowers. In many flowers it forms part of the petals themselves; in others it is a distinct organ. It is not easy to assign the use of honey in the vegetable economy.

in which it is abundantly secreted; but it probably undergoes some change within the insect before it is excreted by it, and deposited in the comb. The flavour of honey varies according to the nature of the flowers from which it is collected: the honey of Minorca, Narbonne, and England are known by their flavours; and the honey prepared in different parts even of the same country differs.[1] It is separated from the comb by dripping and by expression: the first method affords the purest sort; the second separates a less pure honey; and a still inferior kind is obtained by heating the comb before it is pressed. When obtained from young hives, which have never swarmed, it is denominated virgin honey. It is sometimes adulterated with flour, which is detected by mixing it with tepid water: the honey dissolves, while the flour remains nearly unaltered.

Qualities.—Honey has a peculiar saccharine aromatic odour; and a sweet acidulous, sharp taste. In colour it varies from white or a yellowish white to a pretty deep shade of amber or golden-yellow; in consistence, from the fluidity of limpid oil to the stiffness of soft suet: and, when the more limpid kind is kept, it partly crystallizes into little irregular concretions. It evidently contains sugar, mucilage, wax, and an acid: and occasionally some essential oil, as in the perfumed honey of the Crimea. Honey is soluble in water, and partially in alcohol; and, like sugar, passes into the vinous and acetous fermentation. When heated over a slow fire it throws up a scum; and if the heat be continued so as to produce evaporation, the vapour is inflammable, and the honey becomes brown, and acquires an unpleasant flavour, which is strong in proportion to the degree of temperature employed. Lowitz found that the addition of charcoal to a solution of honey deprives it of odour, taste, and colour; but the colour again returns when the solution is evaporated. Cavezzali separated the sugar by first melting the honey, then adding carbonate of lime (egg shells) in powder as long as any effervesence appeared; and, after separating a scum which forms by rest,

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[1] In some parts of Asia and America a poisonous honey is met with, which probably owes its deleterious properties to the flowers on which the bees feed. It is supposed that the honey extracted from the Azalea *pontica*, and some species of the genera kalmia, andromeda, and rhododendron are poisonous: and that the honey carried from the blossom of the Azalea *pontica* was that which poisoned the Greek soldiers in the celebrated retreat of the ten thousand through Pontus. In the island of Bourbon, honey of a green colour, and very fragrant, is procured, and bears a high price in India, to which it is chiefly exported. But bees do not sip the honey secreted in all flowers; thus they refuse that of the crown imperial, Fritillaria *imperialis*, and of the oleander, Nerium *oleander*, which kills thousands of flies.

filtering it and setting it aside to crystallize. The crystals he purified by washing them with alcohol.[1] Proust separated it from a ready-granulated honey by the action of alcohol.[2] The sugar of honey is of two kinds: one resembling the sugar of grapes, the other the sugar of the sugar-cane. Nitric acid converts honey into oxalic acid.

Medical properties and uses.—Honey is laxative, and externally detergent and stimulant. Simple honey is seldom ordered as an internal medicine[3]: indeed, when freely eaten as food, it passes off quickly by stool, and induces colic in some habits; on which account simple syrup should perhaps be preferred in all cases for forming medicinal preparations for internal use. As a local stimulant, it is employed in glysters; and forms an excellent adjunct to gargles in cynanche and in aphthous ulceration of the mouth and fauces. It is also a useful detergent to foul ulcers.

Officinal preparations.—*Mel despumatum*, D. *Mel Boracis*, L.D. *Mel Rosæ*, L. D. *Oxymel*, L. D. *Oxymel Colchici*, D. *Oxymel Scillæ*, L. D. *Oxymel Cupri subacetatis*, D.

MELALEUCA. *Spec. Plant. Willd.* iii. 1428.

Cl. 13. *Ord.* 3. Polyadelphia Icosandria. *Nat. ord.* Myrtaceæ.

G. 1392. *Calyx* five-cleft, half superior. *Corolla, petals* five. *Filaments* numerous, connate in five bodies. *Style* one. *Capsule* half-covered, three-celled.

Species Nova. M. *minor*.[4] Cajuputi Melaleuca, *Rumphius* (arbor alba minor). *Herbar. Amboinense*, ii. *lib.* 2. *cap.* 26. *t.* 17.

Officinal. CAJUPUTI, *Lond.* MELALEUCÆ LEUCADENDRI OLEUM VOLATILE, *Edin.* OLEUM VOLATILE CAJUPUT, *Dub.* Cajuputi oil.

Syn. Cajeput (*F.*), Kajeputohl (*G.*), Cajeput (*I.*), Cajuputa (*Malay*), Kyäpootie tylum (*Tam.*), Kynpootie ka tail (*Duk.*).

The tree which yields this oil is a native of Amboyna, Java, and the south part of Borneo, where it grows very abundantly in dry arid places. It is named cajuputa[5] in the Malay language; and also by the natives *daun kitsjil*, and *caju-kilan*. It is a small tree, in some situations rather a shrub than a tree, with a running root, often arched, and half above the ground. The stem is covered with a rough, pale, lamellated bark. The leaves are alternate, on short petioles,

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[1] *Annales de Chimie*, xxxix. 110. [2] *Journal de Physique*, lix. 428.

[3] The ancients prized it highly as a medicine, as upon it Jupiter was nourished.

[4] As the specimens of the tree which yields the true cajuputi oil, which were sent home by Mr. Christopher Smith, differ from the *M. Leucadendron*, which was formerly supposed to yield it, and agree with the *arbor alba minor* of Rumphius, Dr. Maton and Sir J. E. Smith have fixed this as a new species, under the name of *M. Cajuputi*.

[5] Kayu-puti means in English *white wood;* thence Rumphius terms it *arbor alba*. *Mat. Med. of Hindostan.*

not unlike those of the willow, about three inches long, and little more than half an inch broad, lanceolate, and somewhat falcated; entire, smooth, three-nerved, firm, dry, fragile, of a pale yellowish green colour, and having a very grateful odour. The flowers are white, sessile, and accompanied with minute ovate bractes. The calyx is tubular, five-toothed, and one half deciduous; the petals are roundish, and concave; and the bundles of the filaments, which are long, filiform, and bearing small ovate anthers, are fixed within the tube of the calyx. The germen is inferior, roundish, crowned with a simple slender style longer than the filaments; and becomes a three-celled capsule, containing many small, oblong, angular seeds.[1]

To prepare the oil, the leaves are collected on a hot, dry day, and put into thoroughly dry bags; in which, nevertheless, they soon spontaneously heat and become moist, as if macerated in water. They are then cut in pieces, infused in water, and left to ferment for a night; after which they are distilled. The quantity of oil they yield is very small, scarcely more than three fluid drachms being obtained from two bags of leaves.[2] When newly drawn it is very limpid, pellucid, and volatile; and, Rumphius says, smells strongly of cardamoms, but is more pleasant. It was formerly imported in copper flasks or canisters; but now it is often brought home in quart glass bottles. On account of the high price of real cajuputi oil, it is said to be often adulterated with oil of turpentine, and coloured with resin of milfoil.

Qualities.—The odour of this oil, as it is brought to us, is at first powerful, and similar to that of a mixture of oil of turpentine and camphor, but it soon becomes extremely fragrant and agreeable: the taste is pungent, and resembles very much that of camphor. It is limpid, transparent, and generally of a grass-green colour, which is said to be partly derived from the copper of the flasks; but Mr. Brande says, "none of the samples which I have examined contain copper."[3] When dropped on the surface of pure water, it diffuses itself over it, and very soon completely evaporates, which is a good test of its purity: and it burns rapidly, without leaving any residuum. Like other volatile oils, it is entirely soluble in alcohol, which is not the case when it is adulterated with fixed oil. It is partially soluble in water.

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[1] The natives of the Moluccas macerate the leaves and flowers in fresh oil, and afterwards impregnate the oil with the smoke of benzoin. This preparation they call *minjac money*, or odorated oil, and use it as an unguent for the head.—*Rumphius, Herb. Amboin.* l. c.

[2] *Rumphius.*

[3] *Manual of Pharmacy*, p. 43.

Medical properties and uses.—Cajuputi oil is a highly diffusible stimulant, antispasmodic, and diaphoretic.[1] When taken into the stomach, it produces a sensation of heat, fills and quickens the pulse; and, soon afterwards, a copious sweat breaks out. It is efficaceously given in dropsy, chronic rheumatism, palsy, hysteria, flatulent colic, and other spasmodic and nervous affections. As a local and external stimulant, it is employed diluted with olive oil, as an embrocation to allay the pain of gout and rheumatism, and to restore vigour to joints after sprains. When put into a carious tooth it lulls the pain of toothach; and we have seen much benefit derived from rubbing it on the temples, in defective vision from a weakened state of the eyes. The dose is ♏ ij. to ♏ vj. on a lump of sugar, or in any bland fluid.

MELISSA. *Spec. Plant. Willd.* iii. 146.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.

G. 1118. *Calyx* dry, nearly flat above: with the upper lip subfastigiate. *Corolla,* upper lip somewhat arched, bifid; lower lip with the middle lobe cordate.

Species 1. Melissa *officinalis.*[2] Officinal or Common Balm. *Med. Bot. 2d edit.* 335. *t.* 119.

Officinal. MELISSÆ OFFICINALIS FOLIA, *Edin.* HERBA, *Dub.* Balm leaves.

Syn. Mélisse Citronelle (*F.*), Melisse (*G.*), Melissa (*I.*), Balsamina (*S.*).

Balm is a perennial plant, a native of the south of Europe, growing in mountainous situations, and flowering from July to September. It is cultivated in our gardens.[3] The root is fibrous, and sends up annual stems, which rise about two feet high, and are branched, quadrangular, and smooth. The leaves are opposite in pairs, of a bright green colour, ribbed, deeply serrated, and cordate; the lower ones on long footstalks, and the upper nearly sessile. The flowers, which are in small axillary bunches, forming semi-whorls, stand on slender peduncles, at the base of which are small, oblong, notched, hairy bractes. The calyx is tubular and pentangular: the upper lip tridentate; the lower shorter, and cut into two acute teeth. The corolla, which is tubular, of a yellowish white colour, with the upper lip shorter, and notched, and the lower three-cleft, encloses the anthers: the seeds are four, ovate, and placed at the bottom of the calyx.

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[1] "Hujus olei binæ guttæ cum cerevisia vel vino propinatæ sudores excitant vehementes, cui fini apta medicamenta India exhibet perpauca."—*Rumphius.*

[2] Μελισσοφυλλον Dioscoridis, bees being very fond of it.

[3] It was cultivated by Gerarde in 1596.

For medicinal use, the herb should be cut before it flowers.

Qualities.—The recent plant has the agreeable odour of lemons, which is lost in drying; and an austere, slightly aromatic taste. In distillation with water, it yields a small portion only of a yellow essential oil, on which its odour depends. The watery infusion tastes rough; reddens slightly litmus paper; and affords with persulphate of iron a deep olive, with nitrate of silver a deep brown, and with acetate of lead a copious greenish-white precipitate.

Medical properties and uses.—Balm is stimulant, stomachic, and diuretic. It was formerly prized as a corroborant, in nervous affections; but it is now used only in infusion, as a diluent in fevers.

MENTHA. *Spec. Plant. Willd.* iii. 74.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.

G. 1102. *Corolla* not quite equal, four-cleft; the broader segment emarginate. *Stamens* upright, distant.

* *Spiked.*

Sp. 7. M. *viridis.* Spearmint. *Smith* (*spec.* 3.), *Flora Brit.* 612. *Med. Bot. 3d edit.* 338. *t.* 121.

** *Capitate.*

Sp. 13. M. *Piperita.* Peppermint. *Smith* (*spec.* 4.), *Flora Brit.* 613. *Med. Bot. 3d edit.* 336. *t.* 120. *Eng. Bot.* 461.

*** *Verticillate.*

Sp. 20. M. *Pulegium.* Pennyroyal. *Smith* (*spec.* 12.), *Flora Brit.* 624. *Med. Bot. 3d edit.* 342. *t.* 122.

1. MENTHA VIRIDIS.[1]

Officinal. MENTHA VIRIDIS, *Lond.* MENTHA VIRIDIS HERBA, *Dub.* Spearmint.

Syn. Baume verte (*F.*), Frauenmurze (*G.*), Menta Romana (*I.*), Menta (*S.*).

This is an indigenous, perennial plant, growing in marshy places, and flowering in August. For medicinal purposes it is cultivated. The root is creeping; the stem quadrangular and foliaceous, rising about two feet in height, erect, smooth, and branching. The leaves are opposite, nearly sessile, lanceolate, about two inches and a half long, and an inch broad; of a deep green colour above, paler beneath, pointed, serrated, smooth, and sometimes a little hairy underneath: the flowers are supported on smooth, partial flower-stalks, verticillated, in long, pointed, panicled spikes; furnished with cetaceous, ciliated, lanceolate bractes, longer than the flowers: the calyx is cylindrical and furrowed, with five nearly regular

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[1] Μινθη Hippocratis. Hæc species dignoscitur pedicellis semper glaberrimis.—*Smith, Flor. Brit.* 613.

teeth: the corolla funnel-shaped, tender, smooth, and of a purple colour: the stamens are varying in length, with roundish anthers: and the style, which is filiform, with a bifid divaricated stigma, rises from a four-cleft germen: the seeds are four, small, and generally abortive, owing to the viviparous nature of the roots.

For medicinal use, spearmint is generally cut just as the flowers appear; but for obtaining the essential oil, the flowering plant is preferred. It should be cut in very dry weather.

Qualities.—Spearmint has a strong aromatic odour, and a warm, slightly bitter taste; neither of which qualities is impaired by drying. Both alcohol and water extract its virtues.

Medical properties and uses.—Spearmint is stomachic and carminative. The infusion is serviceable in allaying sickness and vomiting in a weakened state of the stomach.

Officinal preparations.—*Aqua Mentha viridis,* L. D. *Infusum Menthæ comp.,* D. *Oleum Menthæ viridis,* L. D. *Spir. Menthæ viridis,* L.

2. MENTHA PIPERITA.

Officinal. MENTHA PIPERITA, *Lond.* MENTHÆ PIPERITÆ HERBA, *Edin.* MENTHA PIPERITA; HERBA, *Dub.* Peppermint.

Syn. Menthe poivrée (*F.*), Pfeffermünze (*G.*), Peperminte (*Dutch*), Peparmynta (*Swed.*), Menta piperita (*I.*), Verbal nena de sapor de Pimienta (*S.*), Hortelaä apimentada (*Port.*).

Peppermint is an indigenous, perennial plant, growing in moist places, and flowering in August and September. It is generally cultivated for medicinal use, particularly about Mitcham in Surrey[1], whence the London market is chiefly supplied. There are three varieties of peppermint, the first of which is the officinal plant. The root is creeping: the stem quadrangular and channelled, nearly upright, and about two feet high, branching, purplish, and rather hairy, with the hairs bent backwards: the leaves are of a dark green colour, opposite, petiolate, ovate, rather pointed, serrated, the upper side smoother and less pubescent than the under, which is paler, with white and purple veins: the flowers are in terminal spikes, solitary, almost capitate, interrupted beneath, with the lower whorl more remote, and on a foot-stalk: the bractes are lanceolate and ciliated; the calyx is furrowed, tender, studded with glandular points; the base entirely naked, very smooth, and five-cleft, with the teeth of a black-

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[1] Considerably more than one hundred acres of this herb are grown in the parish of Mitcham; but the greater part of the peppermint is made into a *liqueur,* which is sold as a dram in London.—*Stevenson's Survey,* pp. 377, 378.

ish purple colour, and ciliated: the corolla is purple; and conceals within its tube the anthers, which are on short filaments; the germen is four-cleft, with a filiform style, longer than the corolla, and furnished with a bifid stigma.

Dr. Smith supposes that this plant was discovered by Doctor Eales; and on examining the Linnæan Herbarium, now in his possession, he found that the Mentha *piperita*, described by Linnæus, was not our officinal plant, but merely a variety of the M. *hirsuta*, with the odour of peppermint. It was, however, first described by Petiver. "The cultivators of the plant observe, that, to keep up its quality, the roots must be transplanted every three years; otherwise it degenerates into the flavour of spearmint."[1] If the plant be cut in wet weather, it changes to black, and is little worth.

Qualities.—The odour of both the recent and dried plant is penetrating and grateful, in some degree resembling camphor; and the taste pungent, warm, glowing, and bitterish, followed by a sensation of coldness in the mouth. These qualities depend on an essential oil and camphor. The oil can be obtained separate by distillation in water, is of a yellowish colour, and holds the camphor in solution. One pound of the recent plant should yield from f ʒj. to f ℥ ss. of the oil.

Medical properties and uses.—Peppermint is tonic, antispasmodic, and carminative. It is chiefly used to allay nausea and griping, to relieve flatulent colic, and in hysteria; or, as a vehicle, to cover the nauseous taste of other medicines; but to many palates it is extremely disagreeable. It may be given under the form of watery infusion; but the distilled water and the essential oil are generally preferred.

Officinal preparations.—*Aqua Menthæ Piperitæ*, L. E. D. *Oleum Menthæ Piperitæ*, L. E. D. *Spiritus Menthæ Piperitæ*, L. E.

3. MENTHA PULEGIUM.[2]

Officinal. PULEGIUM, *Lond.* MENTHÆ PULEGII HERBA, *Edin.* MENTHA PULEGIUM; HERBA, *Dub.* Pennyroyal.

Syn. Menthe-peuliot (*F.*), Polymûnze Polei (*G. Dutch, Dan.*), Puleja (*Swed.*), Poley (*Pol.*), Puleggio (*I.*), Poleo (*S.*), Poejo (*Port.*).

This is an indigenous, perennial plant, growing on heaths and in moist meadows, and flowering in September. Like the other mints, it is cultivated for medicinal purposes; and becomes more luxuriant and erect. The stem is obtusely quadrangular, trailing, branching, and somewhat hairy; the leaves are petiolate, small, obtuse, bluntly serrated, and in a small degree hairy underneath; the flowers, which are sup-

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[1] *Linnæan Transactions*, v. 176.

[2] Γλήχων Dioscoridis.

ported on stalks covered with short thick hairs, are in sessile whorls, numerous, and many-flowered, and without bractes: the calyx is of a purplish green colour, tender, furrowed, and covered with thick short hairs; five-cleft, with the teeth pointed, unequal, and ciliated: the corolla is twice the length of the calyx, purple, four-cleft, with the base white and externally villous: the stamens are erect, and longer than the corolla; and the germen similar to that of the former species.

Qualities.—The odour is similar to that of spearmint, but less fragrant; the taste aromatic and pungent, with a slight flavour of camphor. These qualities reside in a very volatile essential oil, which rises in distillation with water.[1]

Medical properties and uses.—Pennyroyal was formerly regarded as emmenagogue, expectorant, and diaphoretic; and was in repute for promoting the uterine evacuation, and relieving hysteria, hooping-cough, and asthma; but it is now justly considered of no value, and seldom used in regular practice.

Officinal preparations.—*Aqua Pulegii,* L. E. D. *Oleum Pulegii,* L. D. *Spiritus Pulegii,* L.

MENYANTHES. *Spec. Plant. Willd.* iii. 810.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Gentianaceæ.
G. 229. *Corolla* hirsute. *Stigma* cloven. *Capsule* one-celled.
Sp. 4. M. *trifoliata.*[2] Buckbean. *Med. Bot. 3d edit. t.* 97. *Smith, Flor. Brit.* 225. *Eng. Bot.* 405. *Bigelow, Amer. Med. Bot.* iii. 55.
Officinal. MENYANTHES, *Lond.* MENYANTHIS TRIFOLIATÆ FOLIA, *Edin. Dub.* The leaves of Buckbean.

Syn. Menianthe (*F.*), Bitterklee (*G.*), Water-drieblad (*Dutch*), Vandk lever (*Dan.*), Vattenklofver (*Swed.*), Troylist (*Pol.*), Trifolio fibrino (*I.*), Menyanthes de tres en rama (*S.*), Trevo d'agua (*Port.*).

This is one of the most beautiful of our indigenous plants; found also in the north of Europe and in North America. It is a perennial not uncommon in watery situations, in a black, boggy soil, flowering in June and July. The root is long, round, fibrous, and of a black colour; the stems are spreading, branched, and clothed with sheathing foot-stalks, each of which supports a ternate leaf, formed of three obovate smooth, bluntly-toothed leaflets of a beautiful green on the upper surface, and pale beneath: the flower-stalk, which springs from within the sheath of a leaf, is longer than the leaves, erect, smooth, round, bearing a thyrsus of about ten

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[1] "1 cwt. of fresh pennyroyal affords an average produce of 1 lb. of essential oil."—*Brande's Manual,* p. 146.

[2] Μήνυανθος Theophrasti.

flowers, accompanied by small ovate entire bractes: the calyx is obtusely five-toothed: the corolla a funnel-shaped petal, cleft into five deep segments, which are white, tipped with rose-colour, and closed within with long, fleshy, shaggy fibres on their upper side: the anthers are sagittate, and of a red colour: the germen round; and the stigma cloven and notched, on a slender style twice the length of the stamens.

Qualities.—The leaves of buckbean have a faint, disagreeable odour, and an intensely bitter, nauseous taste, which is extracted by infusion with water. It contains much tannin.

Medical properties and uses.—Buckbean is tonic, diuretic, and purgative. It has been used with seeming benefit in remittent and intermittent fevers, rheumatism, arthritic affections, and in cachectic and cutaneous diseases. In large doses it is apt to excite vomiting. The dose of the dried leaves powdered is from ℈j. to ʒj.; or of an infusion made with ℥ss. of the dried leaves and boiling water Oss., from f ℥j. to f ℥jss. may be taken three or four times a day. It is advisable to unite some aromatic with either of these forms.

MEZEREI CORTEX. Mezereon-bark. Vide *Daphne.*

MOMORDICA. *Spec. Plant. Willd.* iv. 601.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Cucurbitaceæ.
G. 1739. *Male. Calyx* five-cleft. *Corolla* five-parted. *Filaments* five.
——— *Female. Calyx* five-cleft. *Corolla* five-parted. *Style* trifid. *Gourd* opening elastically.
Species 13. M. *Elaterium.*[1] Squirting Cucumber. *Med. Bot. 2d edit. t.* 72.
Officinal. ELATERII PEPONES RECENTES, *Lond.* ELATERIUM, *Edin.* MOMORDICA ELATERIUM; FRUCTUS, FECULA, FOLIA, *Dub.* The fruit of the Wild Cucumber; Elaterium.

Syn. Concombre sauvage (*F.*), Esselsgurken (*G.*), Ezelskomkommers (*Dutch*), Cocomero salvatico (*I.*), Cohombrillo amargo (*S.*).

This species of momordica is a perennial native of the south of Europe, flowering in June and July. It is cultivated in England[2], but does not survive the severity of our winters. The root is large and fleshy, sending forth several thick, rough, trailing stems, which branch and extend three or four feet every way: the leaves are on long petioles, large, rough, of a greyish green colour, and cordate: the flowers are axillary, similar in appearance to those of the common cucumber, but smaller, of a pale yellow colour, with a greenish base: the

[1] Ελατηριον Dioscoridis. Σικυς αγριος antiquorum.

[2] It was cultivated by Gerarde in 1596. It grows abundantly round Constantinople.

male flowers stand on short peduncles, but the female sit on the germen, which is inferior: the fruit into which it swells has the appearance of a small oval cucumber of a greyish colour, and covered with soft spines. When fully ripe it quits the peduncle, and casts out the seed and juice with great force, and to a considerable distance, through the hole in the base where the footstalk is inserted.

For medicinal use the fruit is gathered in September, just before it is ripe: it should be then sprinkled with water; each cucumber cut through longitudinally, thrown upon a sieve, and the clear juice allowed to run from it without pressure. The juice soon becomes turbid, and after standing a few hours a sediment is formed, from which the clear fluid should be decanted. This sediment is elaterium: it should be carefully dried by being spread on fine linen, and exposed to a warm dry air, in the shade. The juice obtained by the expression of the fruit is inspissated, and forms much of the elaterium of the shops.

Qualities.—Elaterium is of a whitish-green, grey colour, light, pulverulent, inflammable, nearly inodorous, and impressing a slightly bitter taste. It contains a peculiar principle, to which Dr. Paris has given the name of *elatin*, and on which the active properties of the fecula depend: whilst Mr. Hennel and Mr. Morries have ascertained that the elatin of Dr. Paris is a compound of the active principle of the elaterium, which Mr. Morries has named elaterin, and chlorophylle. The latter experimentalist has described elaterin as crystallizing in colourless, microscopic, rhombic prisms, silky, bitter and styptic to the taste, insoluble in water, but soluble in alcohol, ether, and hot fixed oils: insoluble in alkalies, but sparingly soluble in diluted acids. Mr. Morries procured 26 per cent. from good British elaterium: 15 from the worst: but only 5 or 6 from French, (see *Extractum Elaterii* among the preparations). Elaterium is often of inferior quality from pressure being employed, and the whole juice evaporated so as to form an extract. The foreign elaterium, which is brought chiefly from Malta, is of a dark colour, and much weaker than the British.

Medical properties and uses.—This fruit is a very violent hydragogue cathartic, operating chiefly on the intestinal exhalants. It was much employed by the ancients, who regarded every part of the plant as purgative; but Dr. Clutterbuck has demonstrated that this is an error.[1] It is the juice, which is lodged in the centre of the fruit, directly around the

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[1] *Lond. Med. Repository,* xii. 67.

seeds, which is the active part. It is also probable that the term elaterium was given by the ancients to very different substances, and Hippocrates applied it to any violent purgative. Dioscorides extolled the fruit as highly efficacious in melancholic and maniacal attacks: it is still used by the Turks in jaundice. It is frequently prescribed in dropsies, and in combination with calomel proves highly efficacious; but, when incautiously given, it may bring on a dangerous hypercatharsis. It is a curious fact, that the activity of elaterium does not prevent the influence of calomel from being as soon displayed on the glandular system as when it is given alone. The dose of good elaterium is from one-eighth to one-fourth of a grain, repeated once in eight hours.

Officinal preparation.—*Extractum Elaterii,* L. E. D.

MORUS. *Spec. Plant. Willd.* iv. 368.

Cl. 21. *Ord.* 4. Monœcia Tetrandria. *Nat. ord.* Urticaceæ.

G. 1664. *Male.* *Calyx* four-parted. *Corolla* none.

——— *Female.* *Calyx* four-leafed. *Corolla* none. *Calyx* becoming a berry. *Seed* one.

Species 5. M. *nigra.*[1] Common Mulberry-tree. *Med. Bot.* 2*d edit.* 712. *t.* 243.

Officinal. MORA, *Lond. Dub.* Mulberries.

Syn. Murier noir (*F.*), Schwarze Maulbeeren (*G.*), Morone o Gelso (*I.*), Moras (*S.*).

This species of mulberry is a native of Persia, whence it was brought to Italy, and gradually spread over Europe. It is now abundantly cultivated in this country, flowering in June, and ripening its fruit in September. The tree, which seldom exceeds thirty feet in height, is covered with a brownish grey bark: the leaves are numerous, on short footstalks, cordate, serrated, veined, about three inches long and nearly as broad; rough on the upper surface, which is of a deep green colour, and covered with minute warts; and paler and villous underneath. The male flowers, which are on the same tree as the female, are in close roundish catkins, composed of caducous florets, which consist of four concave, oval, erect, calycinal leaves, enclosing four filaments bearing simple anthers; the female flowers contain a roundish germen, crowned with two divaricated styles furnished with simple stigmas, enclosed in a calyx of four ovate, concave, erect leaves; which, after flowering, swell, become succulent and coloured, investing the seed; and, many of them being crowded together on one peduncle, form a spurious com-

[1] Συνάμινος Theophrasti.

pound berry, that has the appearance of a real, succulent berry, composed of a number of smaller berries.[1]

Qualities.—Mulberries are inodorous, have a sweet, acidulous taste, and abound with a deep blood-red juice. Hermbstadt found that their acidulous quality depends on the presence of tartaric acid, and I ascertained that they contain also jelly and mucus.

Medical properties and uses.—This fruit is cooling and laxative; and, when not too ripe, allays thirst and proves exceedingly grateful in febrile diseases. It is seldom, however, used medicinally. When eaten too freely, as an article of food, it is apt to occasion diarrhœa. Its colouring matter is perceptible in the urine.

Officinal preparation.—*Syrupus Mori*, L.

MOSCHUS. *Syst. Nat. Gmelin*, i. 172.

D. 1. Mammalia. *Ord.* 7. Ruminantia. *Cuvier.*

G. 28. *Horns* none. *Fore-teeth* eight in the lower jaw. *Tusks* one on each side in the upper jaw, projecting out of the mouth.

Species. M. *Moschiferus.* The Musk Deer. *Pennant, Quadr.* 56. *t.* 10. *f.* 1.

Officinal. MOSCHUS, *Lond. Edin.* MOSCHUS MOSCHIFERUS. *Concretum* MOSCHUS *dictum, Dub.* Musk.

Syn. Musc (*F.*), Bisam (*G.*), Muskus (*Dutch*), Mysk (*Swed.*), Denner (*Dan.*), Muschio (*I.*), Almizcle (*S.*), Almisea (*Port.*), Meshk (*Arab.* & *H.*), Castorie (*Tam.*), Jebat (*Malay*), Mesk (*Pers.*), Rutta Oorrola (*Cyng.*), Ziakoo (*Japanese*).

The animal from which musk is obtained is an inhabitant of the alpine mountains of the east of Asia, particularly of the Himālāyā mountains, which divide Thibet from India, where it is known by the name of *custeru.* It is also found in China. It is a solitary animal, living among the rocks, and frequenting the highest tops of the snowy peaks; very timid, and difficult to be taken. The length of the full grown animal scarcely ever exceeds three feet, and in its general aspect it resembles the deer; the head is not very unlike that of a hog; the eyes are black and full; and, projecting from the upper jaw, the teeth hang pointing downwards over the lower jaw; the fleece is coarser than that of the stag, but very light and soft, and varying in colour at different seasons of the year and different periods of life, chiefly from brown to nearly black, hoary underneath, and sometimes, but rarely, whitish. The tail is very short. Between the umbilicus and the prepuce is an oval bag, flat on one side and convex on

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[1] It is a curious fact, that two mulberry-trees growing near one another bear generally more fruit, and that of a finer quality, than is produced by solitary trees. This is supposed to be owing to the male flowers in one of the trees being more effective than those of the other.

the other, about two inches long and one and a half inch broad, projecting, with a very small orifice, and beset with short hairs. This is the musk bag: it is lined with a smooth membrane, which forms irregular folds, and incomplete partitions in the sac. The musk is probably secreted by this membrane. It is empty in the young animal; but in the adult contains from ʒ ij. to ʒ vj. of musk, in a liquid state. The animal often expresses part of the contents of the bag, when it becomes too full, by rubbing itself against stones; and the matter thus ejected is said to be a purer musk than that which is brought to this country. The bag is generally cut from the animal while it is yet alive; and an idea prevails that the animal must be caught alive in order to obtain the musk, which is said to be absorbed and lost if the deer be shot. As soon as the bag is cut away, a small hollow reed is inserted into it, that the musk may not suffer, which it would be apt to do from want of air; and the whole is tied round with a sinew of the animal.[1]

Musk is imported into England from China in the follicles, packed in caddies, and is termed *Tonquin musk*, which contain from twenty to sixty and one hundred ounces each; but an inferior kind is brought from Bengal, and a still baser sort from Russia, which is in longer and larger bags. It should always be bought in the natural follicle, or the *pod*, as it is denominated in mercantile language. This is a sack or bag, about the size of a pigeon's egg, covered on one side with fawn-coloured hair, and on the other side naked. The sac from a vigorous adult contains about ʒ vj. of musk; but as the animal increases in age the quantity lessens. The musk itself is in grains concreted together, dry, yet slightly unctuous, and free from grittiness when moistened and rubbed between the fingers, or chewed.

As musk is a very high-priced article, it is often adulterated. When this is the case, the bag, which should not have any appearance of having been opened, appears, if narrowly examined, slit or punctured in several places, through which sand, lead, and other heavy matters are inserted. The musk is sometimes nearly all abstracted, and a mixture of dried blood and asphaltum introduced into the bag: or both the bag and the musk are artificial, and only scented with real musk. The blood of the animal itself is often injected into the bag of musk, while both are warm, and they then unite.

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1 *Journ. of a Tour in the Himālāyā Mountains*, by J. B. Fraser, 4to. Lond. 1820, p. 352.

The first of these adulterations is easily detected. The presence of blood may be suspected, if the musk, when held over the flame of a candle on a thin spatula, emits, as it inflames, a fœtid smoke: and asphaltum is discovered by its melting and running before it inflames, if heated on a spatula: whereas real musk inflames without running, and is converted into charcoal.[1] The artificial bags are known by the inner membrane, which lines the real musk bags, being deficient. Musk which is pale or wholly black, of a faint odour, or gritty or moist, should be rejected.

Qualities.—The odour of musk is aromatic, but peculiar, extremely powerful, and durable[2]; the taste is bitterish, acrid, and heavy; and the colour a deep reddish-brown. It burns with a white flame, and leaves a light spongy charcoal. Trituration with potassa developes ammonia. Boiling water dissolves about 80 parts, alcohol only 50, sulphuric ether nearly the whole. The watery *infusion* has a yellowish-brown colour, a bitterish taste, and the strong odour of the musk; and reddens infusion of litmus. Solutions of bichloride of mercury and of sulphate of iron produce with it copious precipitates; as does also infusion of yellow Cinchona bark. Solution of nitrate of silver throws down a whitish precipitate, which, on exposure to the light, changes to a livid blue: and nitrate of mercury produces a brownish precipitate. The *alcoholic tincture* is of a reddish brown colour, transparent, with a slight odour of the musk: water renders it milky, and gives out the strong musk odour: with the other tests it presents the same results as the watery infusion. The *ethereal tincture* has a deep brown colour; and, when evaporated on the surface of water, deposits a brown, tenacious, nearly insipid resin, and renders the water milky. The resinous matter has the musk odour in perfection; while the substance which occasions the turbidness of the water possesses the properties of extractive. From these results, musk appears to contain albumen, gluten, hydrochlorate of soda, phosphate of soda, and an uncombined acid; but the greater part of it consists of a resin combined with a volatile oil, and a mucilaginous extractive matter. According to Thiemann, it con-

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[1] The formation of ammonia, when rubbed with potassa, has also been mentioned as a test of the presence of blood; but the fixed alkalies have developed ammonia in the best specimens of musk we have ever seen.

[2] "A clean cork, which stopped a phial in which there was musk, which it seemed never to have touched, in 1712, smelled of musk more than twenty years after."—*Alston's Let. on Mat. Med.* vol. ii. p. 542. Fée says that one part of musk will communicate its odour to 3000 parts of inodorous powder.

tains carbonate of ammonia 10, wax 9, resin 1, gluten 60, albumen 30, carbonate of potassa 1, hydrochlorate of soda 3, carbonate of lime 4: but besides these, Guibourt and Blondeau found elaïne, stearine, cholesterine, gelatin, and fibrine.

Medical properties and uses.—Musk is stimulant and antispasmodic. Aëtius is the first writer who mentions it as a medicine; but it did not come into general use in this country till the beginning of the sixteenth century. It raises the pulse without much augmenting the heat of the body, and has a remarkable power of resolving spasm, and increasing the energy of the brain and nerves. Hence it is very efficaciously given in typhoid fevers, when low delirium, subsultus tendinum, and hiccough supervene; and in combination with ammonia to arrest the progress of gangrene. Its beneficial effects in all spasmodic diseases are well established; and Cullen says, he can vouch for its powers in retrocedent gout, which in many instances he had seen suddenly relieved by large doses of musk.[1] It checks the vomiting in cholera, at the same time that it allays the tormina of the intestines. In epilepsy I have seen more benefit derived from musk in combination with calomel than from any other remedy; and I am inclined to attribute much of the disappointment which others have experienced, either to the remedy not having been genuine, or to the smallness of the dose. To obtain the full benefit of musk in this disease, the dose must be much larger than that which is usually given; it should be repeated at shorter intervals, and its use longer continued. In an old confirmed case, in which three or four fits were experienced daily, musk, given to the extent of ʒss. four times a day, reduced the number of fits to one in three months. Upon the whole, I agree with Cullen, "that musk is one of the most powerful antispasmodics we are acquainted with[2];" and I regret that the high price of the drug necessarily limits very much its employment.

As a local remedy, musk is said to be useful in atonic deafness, when inserted into the ear with cotton; and it is recommended in the form of enema in the convulsions of children arising from the irritation of dentition.

Musk is best given in substance, in the form of bolus. The dose may be from grs. vj. to ʒss, repeated at intervals of six or eight hours. Its best preparation is the tincture.

Officinal preparations.—*Mistura Moschi*, L. *Tinctura Moschi*, D.

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[1] *Mat. Med.* ii. 381. [2] *Mat. Med.* l. c. 380.

MUCUNA. *De Candolle.*

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.

G. 1349. At the base of the standard, two oblong parallel scales, compressing the wings underneath.

* *Twining.*

Species 16. M. *pruriens.* Cowhage. (Dolichos *pruriens.*) *Med. Bot. 3d edit.* 422. *t.* 153. *Chamberlaine's Practical Treatise on the Efficacy of Stizolobium or Cowhage.*

Officinal. MUCUNA, *Lond.* DOLICHI PRURIENTIS PUBES, *Edin.* PUBES LEGUMINIS, *Dub.* The hairs of the Dolichos pod.

Syn. Puis à gratter (*F.*), Kuhkrütze (*G.*), Kiwách (*H.*), Capicach'hu (*San.*).

This is a perennial climbing plant, a native of America, and the East and West Indies. In Bengal, where it is named *Cadjuct*, it flowers in the cool months from September to March. The root is fibrous: the stem herbaceous, cylindrical, voluble, climbing, and branching; with ternate leaves, on footstalks from six to fourteen inches long, given off alternately at the distance of a foot from each other. The central leaflet is rhomboidal, the two lateral ones oblique, and all of them smooth on the upper surface, and hairy beneath. The flowers are papilionaceous, of a blood colour, peduncled, in pendulous solitary spikes, which hang from the axillæ of the leaves. The fruit is a coriaceous pod, about four or five inches long, curved like the letter *ſ*, thickly covered with bristly, short brown hairs; and containing three or five oval, compressed seeds.

The pods we receive are brought from the West Indies. If incautiously touched, the spiculæ with which they are beset separate easily, and sticking in the fingers occasion the most intolerable itching.

Medical properties and uses.—The spiculæ of Mucuna pods operate as a mechanical anthelmintic. They have been found particularly useful in expelling the round worm, *lumbricus teres;* the spiculæ irritating, and aiding its expulsion, by wounding it without affecting the intestines. The best mode of preparing the remedy is to dip the pods in syrup or molasses, and then with a knife to scrape off the hairs along with the syrup. When the mixture attains the thickness of honey it is sufficiently impregnated with the hairs, and is fit for use.

The dose of this mixture, for a child of three or four years old is a tea-spoonful given in the morning for three days, and then followed by a brisk cathartic.

MYRISTICA. *Spec. Plant. Willd.* iv. 869.

Cl. 22. *Ord.* 13. Diœcia Monadelphia. *Nat. ord.* Myristaceæ.

G. 1851. *Male.* *Calyx* bell-shaped, trifid. *Corolla* none. *Filament* columnar. *Anthers* six or ten united.

——— *Female.* *Calyx* bell-shaped, trifid, deciduous. *Corolla* none. *Style* none. *Stigma* two. *Drupe*, a nut involved in an arillus (*Mace*), with one seed.[1]

Species 1. M. *moschata.* The Nutmeg-tree. *Med. Bot. 2d edit.* 698. *t.* 238. *Rumphius, Herb. Amboin.* ii. *lib.* 11. *c.* 5. *t.* 4.

Officinal. MYRISTICA — MYRISTICÆ OLEUM, *Lond.* MYRISTICÆ MOSCHATÆ NUCLEI, INVOLUCRUM *vulgo* MACIS, *Edin.* NUX MOSCHATA ; OLEUM VOLATILE, ET INVOLUCRUM MACIS DICTUM, *Dub.* Nutmeg ; Mace ; Oil of Nutmeg, essential and expressed ; Oil of Mace.

Syn. Of the Nutmeg: Noix muscade (*F.*), Moscatnuse (*G.*), Nooten-moskat (*Dutch*), Muskad (*Dan.*), Muskot (*Swed.*), Nosce moscata (*I.*), Neuz moscada (*S.*), Noz moscada (*Port.*), Jaêphal (*H.*), Jattipullum (*Cyng.*), Jouzbewa (*Pers.*), Jouzalteil (*Arab.*), Woh pala (*Jav.*), Jadicai (*Tam.*), Jayaphula (*Beng.*), Jatiphalo (*San.*), Pela (*Malay*).—*Of the Mace:* Moshat blumen (*G.*), Macis (*I.*), Macias (*S.*), Jawatri (*H.*), Jatipatri (*San.*), Jadiputrie (*Tam.*), Bunga-buæ-pala (*Malay*), Kambangpala (*Jav.*), Wassawasel (*Cyng.*), Bezbaz (*Pers.*).—*The Oil:* Jadikai tylum (*Tam.*), Jatipullum tail (*Cyng.*).

The nutmeg-tree is a native of the Molucca Islands. It has, however, been nearly extirpated from the greater number of them by the narrow policy of the Dutch, and is cultivated at Banda[2], and also at Bencoolen, in the island of Sumatra, where a sufficient quantity is raised to supply with mace and nutmegs the whole of Europe. Mr. Crawfurd states that the tree is also found in Cochin China and in New Holland. It rises to the height of thirty feet, producing many erect branches, which, as well as the trunk, exude, when wounded, a red glutinous juice, and are covered with a smooth, ash-coloured exterior bark. The leaves, which stand alternately on short petioles, are elliptical, pointed, undulated, entire, and obliquely nerved; of a bright green colour on the upper surface, and greyish underneath, with an aromatic taste. The flowers are present at the same time with the fruit, inodorous, small, supported on axillary peduncles; and male and female on the same, and on separate trees: the calyx in both is fleshy, smooth, and divided at the edge into three moderately spreading segments. There are no corollas. The filaments in the male flowers are short, united into one columnar bundle, inserted into the receptacle, and bear each a linear anther, which surrounds the upper half of the filament. The germ in the female is superior, oval, and crowned with a style terminated by two stigmas. The fruit is an elliptico-spheroidal, one-celled, superior berry, marked with a shallow longitudinal

[1] In our description, we have followed Gærtner, who denominates the fruit "bacca monosperma;" although, in our translation of the generic character by Willdenow, we have not altered the term "drupe."

[2] This term includes six smaller islands: Neyra, Lenteira, Pulo-Aya, Goenenga Apia, Polerona, and Rossengenia; but the first three only bear nutmeg-trees.

groove on one side, fleshy, smooth, one-celled, and the size of a small peach; the flesh is thick, rather solid, and finally dries up to a coriaceous crust, which opens on one side, and displays the nutmeg in its shell covered with an arillus, which is the officinal *mace*, and by it fixed to the bottom of the cell. The mace is a fleshy, coriaceous, saffron, or yellow-coloured substance, divided deeply into many slips, which closely invest the shell of the nutmeg. The kernel, which is the proper nutmeg, is of a roundish-oval form, marked on the outside with many vermicular furrows, within of a fleshy, farinaceous substance; variegated whitish and bay, and having a cavity at the bottom for the embryo.[1]

The nutmeg-tree produces fruit at the age of seven years; its productiveness is at the height at fifteen; and it continues to bear for seventy or eighty years in the Moluccas. It yields three crops annually: the first in April, the second in August, and the third, which is the best, in December; yet the fruit requires nine months to ripen it. When it is gathered[2], the outer coriaceous covering is first stripped off, and then the mace, carefully separated, is flattened by the hands in single layers, and dried in the sun. The nutmegs in the shell are next exposed to heat, not exceeding 140° of Fahr., and to smoke for three months. Much care is necessary in drying them, as they require to be turned every second or third day. The criterion of due preparation is their rattling in the shell. They are then broken, and the kernels thrown into a strong mixture of lime and water, at Banda; but at Bencoolen they are simply rubbed over with dry lime: after which they are cleaned and packed up in casks and chests, smoked, and covered within with a coating of lime and water.[3] This process is necessary for their preservation, for the nutmeg freed from the shell is very perishable: with the same intention the mace is sprinkled with salt water. There are several varieties of the tree; but that denominated the queen nutmeg, which bears a small round nut, is the best. They are imported in chests, which contain each from 100 to 140 lbs. weight[4]; the mace comes in chests also of different

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1 *Gærtner de Fructibus,* t. 41.

2 The fruit which falls from the trees affords an inferior nutmeg. A good tree yields annually from ten to fourteen pounds of nutmegs and mace; and the produce of an English acre about 265 pounds.

3 *Report on the Cultivation of Spices at Bencoolen,* &c. by J. Lumsdaine, Esq. —*Edin. Phil. Journ.* vol. vii. p. 127.

4 The annual consumption of nutmegs in England is 56,960 lbs., and of mace 3620 lbs. *Crawfurd's Indian Archipelago.*

sizes: the essential oil, which is obtained in Banda by the distillation of the nuts, is brought in bottles, and the expressed oil in stone jars. Nutmegs are frequently punctured and boiled in order to obtain the essential oil, and the orifices afterwards closed with powdered sassafras. The fraud is detected by the lightness of the nutmeg. Both the nutmeg and the mace are perforated by the larva of dermestes *Surinamensis.*[1]

Qualities.—The nutmeg has a fragrant, agreeable, spicy odour, and a warm, aromatic taste. It is easily cut with a knife, but is not very pulverulent. When cut transversely, and examined by the microscope, the dark coloured veins which run through its substance appear to consist of cellular matter filled with oil, which is the active matter of the nutmeg. Alcohol and ether extract completely the active qualities of nutmeg. When the ethereal tincture, which is limpid, and of a golden-yellow colour, is evaporated on water, a small portion of volatile essential oil unites with the water, whilst a white, opaque, granular sebaceous substance, heavier than water, which has much the appearance of the expressed oil, is deposited. When alcohol is digested on this substance, it dissolves very little of it, but becomes yellow, and acquires the qualities of a spirituous solution of the essential oil. The undissolved substance, if washed in water, is nearly insipid, melts at a temperature of 150°; and, on cooling, concretes into a translucent, brittle cake, which has the properties of wax. The part of the nutmeg insoluble in ether is chiefly gum and starch. In distillation with water, nutmegs yield $\frac{1}{32}$ part of their weight of essential volatile oil, and by expression one third of a sebaceous fixed oil.[2] Hence, the components of the nutmeg seem to be starch, gum, volatile oil, wax, and a fixed, fat oil. Bonastre obtained from 500 parts of nutmeg, 120 of steärine, 38 of eläine, 30 of volatile oil, 12 of fecula, 6 of gum, 4 of acid, and 290 of lignine and loss. The *volatile oil* possesses the odour and taste of the nutmeg in a concentrated degree, is of a pale straw-colour, limpid, transparent, and lighter than water. The *expressed oil*, which is erroneously called *oil of mace*, when first drawn, is limpid and yellow, but on cooling acquires the consistence of spermaceti, and somewhat of the appearance of Castile soap, being whitish, mottled with reddish brown. It is imported wrapped up in flag-leaves. Its odour is agreeable and slightly aromatic: its taste fatty, pungent, and bitterish. It appears to be a vegetable cerate, or a triple compound of

[1] *Leuwenhoek, Epist.* 92. [2] *Neumann's Chymistry*, 404.

fixed oil, volatile oil, and wax. Besides the genuine expressed oil, there are two other sorts found in the shops; one, which is said to come from Holland, of a paler colour, and in flat square cakes; and another, which is an artificial composition of suet, palm oil, and spermaceti, scented with a little volatile oil of nutmeg. *Mace* resembles the nutmeg in its odour and taste, but is more pungent and bitter. It is in laciniated, flexible, thin pieces, unctuous to the feel, and of a deep reddish-yellow colour. Alcohol and ether extract its active principles; and, when the ethereal tincture is evaporated on water, a thick, deep, yellow-coloured, very pungent, and odorous oil is left in drops on the surface of the water, with some resin: and a small portion of extractive is deposited, but no waxy granular matter.

Medical properties and uses.[1]—As the medical properties of nutmeg and mace depend on the essential oil they contain, they agree in these circumstances; and both are stimulant, carminative, and, in large doses, narcotic. Mace is more generally used as a culinary spice; but the nutmeg and its volatile oil are in frequent use to cover the disagreeable taste of other medicines; and are sometimes ordered in cases of languors, vomiting, and diarrhœa, and in flatulent colic. On account of the narcotic property of the oil, the nutmeg should be cautiously employed in apoplectic and paralytic habits. In India, its dangerous effects have been frequently felt[2]; and in this country, instances have occurred in which the nutmeg, taken in large quantity, produced drowsiness, great stupor, and insensibility; and, on awakening, delirium which alternated with sleep for several hours.[3] The volatile oil is sometimes used as an external stimulant:—the expressed oil is seldom employed for any other purpose. The dose of the nutmeg and the mace is from grs. v. to ℈j.; that of the volatile oil, ♏ij. to ♏iv., combined with sugar as an oleo-saccharum.

Officinal preparations.—*Spiritus Myristicæ*, L. E. D. *Spir. Ammoniæ aromat.*, L. D. *Spiritus Armoraceæ comp.*, L. D. *Spir. Lavandulæ comp.*, L. E. D. *Confectio aromatica*, L. D. *Electuarium Catechu*, E.

MYROXYLON. *Spec. Plant. Willd.* ii. 546.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

G. 829. *Calyx* bell-shaped, five-toothed. *Petals* five, the upper one larger than the others. *Germen* longer than the corolla. *Legume* with one seed only at the point.

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[1] Avicenna first noticed nutmegs as a medicine.

[2] *Bontius de Medicinâ Indorum*, 20.

[3] *Cullen, Mat. Med.* ii. 204.

Species 1. M. *peruiferum.* Sweet-smelling Balsam tree. *Hernandez Nova Plant., &c. Mexican Hist. fol.* 51. *cum figurâ.*
Officinal. BALSAMUM PERUVIANUM, *Lond.* MYROXYLI PERUIFERI BALSAMUM, *Edin. Dub.* Peruvian Balsam.

Syn. Beaume de Pérou (*F.*), Peruvianischer Balsam (*G.*), Peruviaanische Balsam (*Dutch*), Swart Perubalsam (*Swed.*), Balsamo del Peru (*I.*), Balsamo de Quinquica (*S.*).

The Peruvian balsam-tree is a native of the warmest provinces of the continent of South America: growing in the mountains of Panatalmas[1], in the forests of Puzuzu, Muna, Cuchero, Paxaten, and many other places near the river Maranon, blossoming in August, September, and October. It is a very beautiful tree, with a smooth, thick, straight trunk, covered with a grey, coarse, compact, heavy bark, which is interiorly of a straw colour, and very resinous, as is every part of the tree. The branches extend almost horizontally. The leaves are alternate, and abruptly pinnate. The leaflets in two pairs, nearly opposite, petiolate, ovato-lanceolate, with the apex lengthened and somewhat blunt and emarginate, entire, shining, veined, and very smooth. The midrib, which runs through the whole length of the under surface of the leaf, is raised and pubescent; the common petiole is round and pubescent. The flowers are scattered, on axillary, erect racemes, longer than the leaves. The peduncles are roundish and pubescent; each supported by a small, erect, ovate, concave bracte, appearing to the naked eye like a tubercle: the pedicels are erect. The calyx is bell-shaped, dark green, divided into five small, nearly equal teeth, but with one of them so far separated as to be found under the germen. The corolla consists of five white petals: four narrow, equal, lanceolate, and larger than the calyx; the fifth reflex, broad, and double the size of the others. The stamens are ten, inclining, and inserted into the calyx; bearing elongated, sharp-pointed, sulcated anthers. The germen is oblong, pedicillated, inclining; the style short, subulate, and crooked, crowned with a simple stigma. The seed-vessel is a straw-coloured, club-shaped, somewhat curved, pendulous legume, globular near the top, and terminated by the curved style. It contains, in a cell in the curved part, one seed only, which is crescent-shaped, and projects from the cell. The substance of the leaves is full of translucent, linear points, like the leaf of the orange-tree.

This tree is called *quinquino* by the natives, and also hirtziloxitl, cabureiba, under the first of which it was de-

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[1] Mutis discovered it, and sent a branch of the tree to the younger Linnæus, about the year 1781.

scribed by Hernandez, and under the second by Piso. The natives use the bark as a perfume. The balsam, which is procured in a liquid state, from incisions made early in the spring, is collected in bottles, and is called *white liquid balsam.* What is found in the shops is obtained either by boiling the twigs in water or by putting the end of a billet of the wood in a fire, and thus forcing out the balsam at the opposite end. It is imported in jars, each containing from twenty to forty pounds weight. When the Indians collect the white balsam in calabashes, which is the case in Carthagena and in the mountains of Tolu, it condenses and hardens, and forms *dry white balsam,* or the balsam of Tolu. Ruiz says there is no difference in these three balsams, excepting in name, colour, and consistence. A mixture of resin and some volatile oil with benzoin is often sold for Peruvian balsam; and the fraud is not easily detected.

Qualities.—The balsam which we receive has a fragrant aromatic odour, much resembling that of benzoin, with a warm bitterish taste, leaving a slight sensation of burning in the throat after it is swallowed, with some degree of sweetness. It is viscid, of a deep, reddish-brown colour, being that which is obtained by boiling the twigs, and of the consistence of fluid honey. Its sp. gr. is 1·14 to 1·15. Water boiled on the balsam becomes acidulated, and deposits on cooling crystals of benzoic acid. In distillation with water, a small portion of a volatile, limpid oil comes over, and benzoic acid sublimes in the neck of the retort. Its remaining matter is a resin. Ether, in small quantity, dissolves it readily and completely; alcohol also dissolves it, but the quantity of menstruum must be considerable. Sulphuric acid converts it into artificial tannin and charcoal. Treated with nitric acid, some prussic acid is formed, benzoic acid sublimes, and the residual matter is artificial tannin.[1] The alkalies and their carbonates form with it thick masses, which, on the addition of sulphuric acid, let fall a resinous matter, and benzoic acid crystallizes. Hence Peruvian balsam appears to consist chiefly of resin, volatile oil, and benzoic acid; but according to Stoltze the oil is of a peculiar nature, differing from volatile oil. The result of his analysis is, that 1000 parts of the balsam consist of 24 of brown, nearly insoluble resin, 207 of soluble resin, 690 of the above oil, 64 benzoic acid, and 6 of extractive matter.

Medical properties and uses.—Balsam of Peru is stimulant and tonic. It has been regarded as expectorant also, and re-

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[1] *Hatchet. Phil. Trans.* 1806. *Thomson's Chymistry,* 4th edit. v. 126.

commended in catarrh and other pulmonary affections; but it is contra-indicated wherever any inflammatory action is present; and to its stimulant operation on the pulmonary exhalants we may ascribe its use in chronic asthma and old obstinate coughs.[1] In gleets, leucorrhœa, palsy, and chronic rheumatism, its tonic powers have proved beneficial; as well as in many other cases of debility. It may be given to the extent of f ʒj. for a dose. As a local stimulant it is employed externally with great advantage for cleansing and stimulating foul and indolent ulcers; and a mixture composed of ʒj. of the balsam and ʒiij. of ox-gall, I have found extremely useful when dropped into the ear every day, after syringing with a solution of soap, in fœtid discharges of the ear.

BALSAMUM TOLUTANUM.

Syn. Beaume de Tolu (*F.*), Tolutanischer Balsam (*G.*), Balsama Tolutano (*I.*), Balsamo de Tolu (*S.*).

The tree which yields the balsam of Tolu has been ascertained[2] to be the Myroxylon *Peruiferum*, the same from which the balsam of Peru is procured. The Tolu balsam is the white balsam of Peru, hardened by exposure to the air. It is obtained from incisions of the bark, from which it flows freely in hot weather; and is afterwards put into mats and calabashes to condense and harden, in which state it is brought to this country.

Qualities.—Balsam of Tolu has an extremely fragrant lemon odour, and a warm, somewhat sweetish taste. It is of a yellow, reddish-brown colour, and of a thick tenacious consistence, becoming solid and brittle by age. Exposed to heat it melts, easily inflames, and disperses, along with its peculiar odour, that of benzoic acid. In distillation with water, it yields a small portion of volatile oil, impregnates the water with its odour, and by continuing the process benzoic acid sublimes. It is soluble in alcohol, forming a tincture which is rendered milky by water, but no precipitate falls. Mr. Hatchett found, that when it is dissolved in the smallest quantity of solution of potassa, its own odour is lost, and it acquires a permanent, fragrant smell, resembling that of the clove-pink. When digested in sulphuric acid, a considerable quantity of pure benzoic acid sublimes; and the same occurs during its solution in nitric acid, which also evolves traces of hydrocyanic acid.

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[1] Sydenham gave it in phthisis.

[2] Vide *A Description of the Tree named Quinquino in Peru, &c. By Don Hippolito Ruiz;* translated in *Lambert's Illustrations of the Genus Cinchona,* 4to. Lond. 1821. p. 92.

Medical properties and uses.—Tolu balsam is a stimulating expectorant; and although less heating than the other balsams, is nevertheless improper in pulmonic affections attended with inflammation. It forms an elegant addition to more active medicines in cases of asthma and chronic catarrh; and on the whole is more employed on account of its agreeable flavour than for any efficacy it possesses. The dose of the balsam may be from grs. v. to ʒss., suspended in water by means of mucilage or yolk of egg.

Officinal preparations.—*Tinctura Benzoini composita,* L. E. D. *Tinctura Balsami Tolutani,* L. *Tinctura Toluiferæ Balsami,* E. D. *Syrupus Tolutanus,* L.

MYRRHA. Vide *Balsamodendron.*

MYRTUS. *Spec. Plant. Willd.* ii. 967.

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. ord.* Myrtaceæ.

G. 973. *Calyx* five-cleft, superior. *Petals* five. *Berry* two or three-celled, many-seeded.

Species 28. Myrtus *Pimenta.* Pimenta or Allspice-tree. *Med. Bot. 3d edit.* 541. *t.* 194.

Officinal. PIMENTA, *Lond.* MYRTI PIMENTÆ FRUCTUS, *Edin.* PIMENTA, *Dub.* Pimenta berries. Jamaica Pepper.

Syn. Poivre de Jamaique (*F.*), Nelkenpfeffer (*G.*), Jamaika pepper (*Dutch*), Krydd peppar (*Swed.*), Pimenti (*I.*), Pimienta (*S.*).

This tree is a native of South America, where it is called Pumake (in the Maypure language), and of the West India islands. It grows in great plenty on the hilly parts, on the north side of the island of Jamaica; flowering in June, July, and August, and soon afterwards ripening its fruit. It is a handsome tree, rising in height about thirty feet, straight, branching, and covered with a very smooth grey bark. The leaves, which are supported on footstalks at the ends of the twigs, are elliptical, pointed, of different sizes, but the largest are five inches long, and two broad in the middle, smooth, thin, entire, shining, and of a deep-green colour. The flowers are produced in terminal bunches, or rather are trichotomous panicles: the calyx is four-cleft; the petals four, reflected, of a pale green colour, enclosing many longer, spreading filaments of the same colour, supporting pale-yellow, roundish anthers. The fruit is a spherical berry, crowned with the persistent calyx: when ripe, it is black, or dark purple, smooth, shining, and bilocular, with the seeds enveloped in a moist, green, pungent, aromatic pulp.[1]

The fruit, which is the part of this plant medicinally used,

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[1] Sloane, *Phil. Trans.* xvii. 462.

is gathered before it is ripe [1], and exposed to the sun for many days, spread thin upon cloths. They require to be frequently turned and carefully preserved from the dews. By degrees, under this management, they become wrinkled, and change from green to a brown colour; after which they are packed in bags and hogsheads for the European market. The more fragrant and smaller they are, the better they are accounted.[2]

Qualities.—Pimenta has an aromatic, agreeable odour, resembling that of a mixture of cinnamon, cloves, and nutmegs, with the warm pungent taste of the cloves; qualities which reside chiefly in the cortical part of the dried berry. Water, alcohol, and ether extract its virtues. The watery infusion is of a brown colour, and reddens litmus. With solution of sulphate of iron it immediately strikes a deep black colour, and slowly lets fall a precipitate. Nitrate of mercury precipitates it of a yellowish-brown; acetate of lead, of a dirty green; and nitrate of silver, of a deep reddish-brown colour. It is also precipitated by infusion of yellow cinchona bark. The sulphuric and hydrochloric acids redden it, and throw down pale, rose-coloured precipitates. The nitric acid forms no precipitate, but gives the infusion a yellow hue. The alcoholic tincture is rendered milky, and slowly precipitated by water: the ethereal, when evaporated on water, deposits drops of a greenish-yellow heavy volatile oil; and leaves a pellicle of a pungent, nauseous-tasted resin, and some extractive. Hence pimenta appears to contain a volatile oil, resin, extractive, tannin, and gallic acid.

Medical properties and uses.—Pimenta is stimulant and tonic. It is useful as an adjunct to bitters in dyspepsia, attended with much flatulence, and in arthritic and hysterical affections. The watery infusion of it, sweetened with sugar, and with the addition of a little milk, is very readily taken by children; and is an excellent cordial in malignant measles, scarlatina, confluent small-pox, and the other exanthemata, when the fever assumes the typhoid type. But the most common use of Pimenta in medicine is to cover the disagreeable taste of other remedies, or to give them warmth. The dose is from grs. v. to ℈ij., in powder, or in their entire state.

Officinal preparations.—*Aqua Pimentæ,* L. E. D. *Spiritus Pimentæ,* L. E. D. *Oleum Pimentæ,* L. E. D. *Pilula Opiata,* E. *Syrupus Rhamni,* L.

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[1] When the berries ripen, they lose much of the aromatic warmth for which they are esteemed, and acquire a taste similar to that of juniper-berries.

[2] Sloane, l. c.

NICOTIANA. *Spec. Plant. Willd.* i. 1014.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.

G. 379. *Corolla* funnel-shaped, with the border plaited. *Stamens* inclined. *Capsules* two-valved, two-celled.

Sp. 1. N. *Tabacum.*[1] Tobacco. *Med. Bot. 3d edit.* 208. *t.* 77.

Officinal. TABACUM, *Lond.* NICOTIANÆ TABACI FOLIA, *Edin. Dub.* Tobacco-leaves.

Syn. Tabac (*F.*), Taback (*G. Dutch*), Tobak (*Dan. Swed.*), Tabak (*Pol.*), Tabacco (*I.*), Tobaco (*S. Port.*), Pоghei elly (*Tam.*), Bujjer hany (*Arab.*), Doorkole (*Cyng.*), Tam bracoo (*Malay*), Tambroco (*Jav.*), Tambácu (*H.*), Támracuta (*San.*), Quauryetl (*Mexican*), Sang-yen (*Chinese*).

Tobacco is an annual plant, a native of America, and partially cultivated in Europe; flowering in July and August. The root is large and fibrous, and sends up an erect, branching stem, about four feet in height, round, villous, slightly viscid, and furnished with numerous, large, alternate, entire, pointed leaves, the lowermost of which are about two feet long and four inches broad; they are sessile, a little decurrent, with a strong midrib, and of a pale green colour on the upper surface, and still paler underneath. The flowers are in large terminal panicles, with long linear-pointed bractes at the base of each division: the calyx is bell-shaped, obscurely pentangular, villous, slightly viscid, and cleft into five acute, erect segments; the corolla is very viscid, its tube twice the length of the calyx, of a pallid greenish hue, and swelling into an oblong cup, which expands into five pointed, plaited, pale, red, or rose-coloured segments: the stamens are the length of the tube of the corolla, and support awl-shaped, compressed, oblong anthers: the style, which is the length of the corolla, and crowned with a capitate, slightly-cleft, stigma, rises from a conical germen, that changes to an ovate capsule containing many reniform, small seeds, and opening at the apex.

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[1] This plant was first discovered by the Spaniards in Yucatan in 1520, and was there called *petun* or *petema.* Humboldt says it has been cultivated from time immemorial by the native people of the Oroonoko; and was smoked all over America at the time of the Spanish conquest. He found only two of the species cultivated in Europe, the N. *paniculata* and N. *glutinosa,* growing wild; but the N. *loxensis* and *andicola,* which he found on the Andes, 1850 toises of elevation, closely resemble the *tabacum* and *rustica.* It was transported to the West Indies and North America; and brought to Europe by Hernandez de Toledo, who came from Florida to Portugal in the beginning of the 16th century. The seeds were sent from Portugal to Catherine de Medicis by Jean Nicot, an agent of Francis II., after whom it received its generic name Nicotiana; it was also called *Herbe* à la reine. The specific appellation is taken from *tabac,* the name of an instrument used by the natives of America in smoking the herb. The following are the names by which it is known in America; *yeth* in the Mexican or Azteek tongue; *sema* in Algonkiu; *oyugoua* in the Huron; in the Peruvian it is *sayri;* in Chiquito, *pâis;* in Vilela, *tusup;* Mbaja, *nalodagadi;* Moxo, *sabare;* Omagua, *potema;* Tumanac, *cavai;* Maypure, *jema;* and Cabre, *sena.*—Humboldt, *Person. Narr.* vol. v. p. 666.

Tobacco was at one period raised to a considerable extent in Yorkshire[1]; but the cultivation of it for the purposes of trade has been long prohibited; and this country, as well as the greater part of Europe, is chiefly supplied from Virginia, where the plant is cultivated in the greatest abundance. There are two varieties of this species, known by the name of Virginian tobacco, a broad and a narrow-leaved sort; but they do not differ in their medical properties. In Virginia, the plant is not allowed to attain its full height, but is topped whenever a certain number of leaves is thrown out; by this process the plant becomes bushy, and the leaves are known to be ripe when a small bluish spot shews itself on the point of union between the leaf and the stem. It is cut down in August, and is not considered good if gathered in damp weather, or when the sun is not in full force. The plants are hung up in pairs, in sheds, to dry; after which the leaves are separated from the stem, bound up in bundles, and packed in the hogsheads in which they are exported.[2]

Qualities.—The recent leaves possess very little odour or taste; but when dried their odour is strong, narcotic, and somewhat fetid; their taste bitter and extremely acrid. When well cured, their colour is yellowish green. They emit sparks in burning, and give out a suffocating smoke; and, when distilled, yield an empyreumatic volatile oil of a green colour, on which their medicinal properties partly depend, and which is said to be a very virulent poison.[3] This oil is dissipated by the long coction of tobacco with water; yet, in distillation with ether, water, or alcohol, no oil comes over. By infusion, however, it yields its active principles to all of these fluids. Its deflagration shows the presence of nitrate of potassa: and Bouillon La Grange discovered hydrochlorate of potassa in its inspissated juice.[4] According to Vauquelin, tobacco appears to contain albumen or gluten, supermalate of

[1] It was first cultivated in England in 1570, according to Lobel's account.

[2] The Creoles of Tierra Firme cure their tobacco in two ways: the first stage of the *cura seca*, or dry preparation, is nearly the same as that used in Virginia; but the leaves are next stripped of their midrib, and formed into balls to ferment; after which they are unrolled, and undergo a variety of treatment until they are dry; the *cura nigra*, or black or fluid preparation, is somewhat different, and intended to get the juice from the leaves; after various fermentations this is boiled to the consistence of a syrup, and is in great request, particularly with the females, who relish it as sailors do the chewing of the tobacco.

[3] The poisonous effects of this oil are very powerful. Mr. Barrow, speaking of the use which the Hottentots make of tobacco-oil for destroying snakes, says, "A Hottentot applied some of it from the short end of his wooden tobacco-pipe to the mouth of a snake, while darting out his tongue. The effect was instantaneous as an electric shock; with a convulsive motion, that was momentary, the snake half untwisted itself, and never stirred more; and the muscles were so contracted that the whole animal felt hard and rigid, as if dried in the sun."—*Travels in Africa*, p. 268.

[4] *Journal de Physique*, xxxix. 193.

lime, acetic acid, nitrate and hydrochlorate of potassa, hydrochlorate of ammonia, a red matter soluble in alcohol and water, a green fecula, and a peculiar substance on which the properties of the plant appear to depend, and which has been therefore named *nicotin.* This substance is colourless, acrid, has the odour of tobacco, and like it occasions violent sneezing. It is volatile, poisonous, and produces colourless solutions with alcohol and water, from which it is thrown down by tincture of nutgalls. Vauquelin regards it as approaching the volatile oils in its properties.[1]

Medical properties and uses.—Tobacco is narcotic, sedative, emetic, diuretic, cathartic, when it is taken into the stomach, and errhine when it is externally applied. The three first mentioned properties are sufficiently obvious, even from the effects which smoking or chewing it produce on persons unaccustomed to its use.[2] From Mr. Brodie's experiments, the infusion of tobacco produces its effect on the heart through the medium of the nerves. The symptoms are, very severe sickness, headache, extreme debility, cold sweats, and sometimes even convulsions. The production of such a state of the habit, however, being useful for relieving violent spasmodic constriction, tobacco is advantageously employed in obstinate constipation, ileus, suppression of urine, and incarcerated hernia, when other remedies fail of affording relief. The smoke is either thrown into the rectum by means of a pair of bellows of a peculiar construction, or an infusion of the leaves is exhibited in the form of enema.[3] From its

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[1] Vide *Ann. de Chimie*, tome lxxi. p. 139.

[2] The custom of smoking tobacco was introduced into England by Sir Walter Raleigh, and was at one time extremely prevalent, but is now confined chiefly to the lower class of the people. In some parts of Europe, however, it is still regarded as the greatest solace and pleasure of the luxurious. It is a curious fact, that in England an edict was published against its use, the reason of which was probably the apprehension thus stated by Camden:—"Anglorum corpora in barbarorum naturam degenerasse, quum iidem ac barbari delectentur."—*Annal. Eliz.* p. 143. James I. wrote against it: Urban VIII., in the beginning of the 17th century, anathematized those who used it in churches; and in Constantinople, where its use is now so general, the custom was, in the beginning of the 17th century, thought so ridiculous and hurtful, that any Turk who was found smoking was conducted in ridicule through the streets with a pipe transfixed through his nose. Tobacco, which has been introduced into the Sandwich Islands by Europeans, "is now," says Kotzebue (vide *Voyage of Discovery*) "so generally used that young children smoke before they learn to walk, and grown-up people have carried it to such an excess, that they have fallen down senseless, and often died in consequence." In the province of Varinas, in South America, the women carry the *chimoo,* which is a preparation of inspissated tobacco juice, in a small box, which they wear like a watch, suspended to one side at the end of a string. Instead of a key it is furnished with a little spoon, with which they help themselves from time to time, relishing it in their mouths like a sweetmeat. *Colombia,* vol. ii. p. 116.

[3] The native doctors in India apply the leaves to the orifice of the anus. Vide *Ainslie's Mat. Med. of Hindostan,* 4to. p. 48.

narcotic power, also, the smoking or chewing tobacco has been found useful in allaying the pain of toothache; and smoking it has been recommended, and in some instances found useful, in shortening and rendering more supportable the paroxysm of spasmodic asthma. The infusion has been used as an emetic; but the practice cannot be recommended: and notwithstanding the extraordinary success of Dr. Fowler [1], who employed it in dropsy and dysury, its general effects are too violent for internal exhibition; and it is not equal as a diuretic either to squill or foxglove, which are more manageable remedies. In dysury, however, as Dr. Pearson has observed, its antispasmodic properties are of advantage, and consequently its use in that complaint is less objectionable.[2] The external application of a strong infusion of tobacco, or of a cataplasm of the moistened leaves themselves, is sometimes employed as a local stimulant in porrigo, scabies, and some other cutaneous eruptions; but even in this mode of using it, tobacco is apt to induce the same virulent effect as when it is internally administered in large doses.

But tobacco is chiefly employed as a sternutatory, and is the basis of all the kinds of *snuff* generally used.[3] The powdered leaves, when snuffed up the nostrils of those unaccustomed to the use of snuff, excite vehement sneezing, and promote a considerable discharge from the nostrils, answering all the purposes for which errhines are employed. As a luxury, snuff has been used upwards of two hundred years in Britain, and has been taken in great quantities without any perceptible bad consequence; although it has been asserted that its immoderate use weakens the sight, produces lethargy, and gives a tendency to apoplexy. After the use of it has become habitual, it cannot be relinquished without considerable risk, arising from the suspension of the artificial discharge it produces, as Dr. Cullen observed from his own experience.[4]

The London College has given a formula for an infusion proper to be used as an enema: as a diuretic, the infusion employed by Dr. Fowler is made with ℥j. of the dried leaves,

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[1] *Med. Reports on the Effects of Tobacco*, &c. Of thirty-one cases treated by Dr. Fowler, sixteen were cured, ten relieved, and three received no benefit.

[2] *Practical Synopsis*, &c. 228.

[3] In the manufacture of snuff, salt, urine, hydrochlorate of ammonia, and even powdered glass are added to the tobacco. The difference of flavour depends, in some, on the species of nicotiana employed, but chiefly on the preparation of the leaves, and these having undergone fermentation. *Macouba* derives its flavour from the leaves being fermented with an addition of the best cane-juice.

[4] *Materia Medica*, ii. 437.

and Oj. of boiling water, and given in doses of ♏lx. to ♏lxxx. twice a day.

Officinal preparations.—*Infusum Tabaci,* L. D. *Vinum Nicotianæ Tabaci,* E.

NUX VOMICA. Vide *Strychnos.*

OLEA. *Spec. Plant. Willd.* i. 44.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. ord.* Oleaceæ.

G. 36. *Corolla* four-cleft, with subovate segments. *Drupe* one-seeded.

Species 1. O. *Europæa.*[1] European Olive. *Med. Bot.* 3d *edit.* 280. *t.* 93. *Sibthorp, Flora Græca, t.* 3.

Officinal. OLIVÆ OLEUM, *Lond.* OLEÆ EUROPÆÆ OLEUM FIXUM, *Edin.* OLEUM EX FRUCTU, *Dub.* The Oil of the Olive.

Syn. Huile d'Olive (*F.*), Olivenhöl (*G.*), Olyfoly (*Dutch*), Bamolja (*Swed.*), Oglio d'Ulive (*I.*), Azeite (*S.*), Zeet (*A.*), Iaban Zeitan Agazi (*Turkish*).

The olive-tree is a native of Asia and the north of Africa, where it is named Zituna; but it is cultivated abundantly in the Greek islands near Smyrna, in France, Spain, and Italy. It has been raised in the open air in England, but its fruit, it is said, has never been ripened.[2] It grows upon the most rocky, calcareous soil, seldom exceeds twenty feet in height, and has a solid, upright, much-branched stem, covered with a grey bark: the leaves are evergreen, opposite, spreading, nearly sessile, stiffish, lanceolate, entire, from two to three inches long, and scarcely half an inch broad in the middle, with the margin a little turned back; of a full green colour, smooth and even on the upper surface, and pale on the under. The flowers are in opposite, axillary clusters, half the length of the leaves, on short flower-stalks, with small, concave, obtuse, hoary bractes: the calyx is deciduous, four-cleft, and regular: the corolla white, four-parted, regular, spreading; with ovate, obtuse, obscurely three-nerved segments; the stamens are shorter than the corolla, divaricated, supporting large pale-yellow, elliptical anthers; the stigma is bipartite on an erect style, rising from a roundish, superior germen; the fruit is a smooth oval plum, or *drupe,* about three fourths of an inch in length, and half an inch in diameter; of a deep

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[1] Ἐλαια αγραια Dioscoridis. Αγροελια of the modern Greeks. Unclarified oil is called oglio *misto,* the clarified oglio *chiaro* in Italy.

[2] *Miller's Gardener's Dictionary,* ed. 1797, art. *Olea.* I have been informed, however, that it has ripened its fruit in Devonshire. The olive attains to a great age. Chateaubriand says that in the olive garden at Jerusalem are eight olive trees, which pay one *media* only each to the Grand Seigneur, a proof that they were in existence and bearing fruit before the Turkish invasion, as all olives planted since that time pay half their annual crop. There is an olive tree at Pescio, in Italy, 700 hundred years old, and 25 feet in circumference.

violet colour when ripe, whitish and fleshy within, bitter and nauseous, but replete with a bland oil[1], and covering an osseous, oblong, pointed, rough nut. There is a variety with shorter, almost obovate leaves.[2]

There are several varieties of the olive tree, of which the variety γ, or *longifolia* of Willdenow, is most esteemed, as affording the best oil. The young plant bears at two years old, and at six years is in full bearing; but the best oil is procured from the fruit of trees which have been grafted. The value of the tree continues to increase until it has passed its one hundredth year, after which it declines. The mode of obtaining the oil from the ripe fruit was known very early in Egypt; and it is chiefly for this purpose that the tree is now cultivated in Spain, Provence, and Italy. To procure the oil, the ripe fruit is gathered in November, and immediately bruised in a mill, the stones of which are set so wide as not to crush the nut. The pulp is then subjected to the press in bags made of rushes; and, by means of a gentle pressure, the best oil, which is called virgin oil, flows first; a second sort is got by breaking the marc, moistening it with warm water, and returning it to the press; and lastly, a very inferior kind is obtained, either by boiling the magma, or by breaking, moistening, and fermenting it in large cisterns, and again submitting it to the full force of the press. When the olive is not sufficiently ripe, the recent oil has a bitterish taste, and when too ripe it is thick and glutinous. After the oil is drawn, it deposits by standing a white, fibrous, albuminous matter; from this the clear oil is poured off, and a second deposition takes place; after which, if put into clean glass flasks, there is no further alteration.[3]

The best oil is made in Provence, its excellence arising from the olives being carefully cleaned and garbled: but what we receive in this country comes from Lucca and Florence. Sicily also furnishes some, but it has a resinous flavour.[4] Good oil has lately been brought from Samos. Much of its goodness depends on the place where the oil is kept: on this account the oil of Gallipoli, which is kept in caverns cut in the rock,

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1 The unripe fruit, when pickled in a strong solution of common salt, is a well-known luxury of the table.

2 The wild olive is distinguished by the more oval shining leaf, the flower exactly similar to the cultivated, the leaves of which are lanceolate, and remarkably grey in appearance compared to the wild.

3 A very old olive-tree, near Gerecomio, yielded 240 English quarts of oil, in 1809. *Three Months near Rome*, by Maria Graham, p. 49.

4 This flavour has been ascribed to the Sicilian olives being grown on dry hilly situations. *Galt's Letters from the Levant*, 8vo. p. 129.

is excellent. The oil has been good after seven years in the Gallipolian cisterns. It is imported in jars, half-jars, and what are called half-chests, which are wooden packages containing flasks.[1]

Qualities.—Pure olive oil is an insipid, inodorous, pale, greenish-yellow coloured, viscid fluid; unctuous to the feel; inflammable, incapable of combining with water, and nearly insoluble in alcohol. It is fixed in any temperature under 600°, suffering considerable expansion, but not evaporating; and congeals at 38° of Fahrenheit. It is the lightest of the fixed oils, its specific gravity being 0·9153. When kept for a great length of time, or much exposed to the air, its components[2] are partially separated, the sebacic acid and water are formed, and the oil acquires a disagreeable smell and sharp taste, becomes thick, brown-coloured, and is then said to be rancid. The rancidity is hastened by heat, and by the admixture of poppy oil, with which it is often adulterated. The purity of olive oil is readily discovered by adding to twelve parts of the suspected oil one part of a solution of protonitrate of mercury[3], and then shaking them strongly together every ten minutes for two hours, after which the mixture is left at rest. The nitrate solidifies olive oil, but leaves the oils of poppy, of linseed, or of other grains, liquid.

Medical properties and uses.—Olive oil is demulcent, relaxant, and laxative. It is used internally as a demulcent in catarrh and other pulmonary affections, diffused in water by means of mucilage; and is also given internally, in large quantities, to mitigate the action of acrid substances, as some poisons, taken into the stomach; and in cases of worms. Externally applied, it is a very useful relaxant, and instead of stopping up the cutaneous exhalants, appears to promote the excretion of sweat; on which account it has been employed with great advantages in frictions in the commencement of plague. The body is ordered to be very briskly rubbed all over with a clean sponge dipped in warm olive oil: copious perspiration generally follows, and the operation must be repeated once a day until symptoms of recovery appear. Mr. Jackson relates that the Coolies, who are employed in the oil stores at Tunis, smear themselves all over with oil, and are seldom afflicted with the plague when it rages in that

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1 4,158,000 gallons were imported into England in 1831.

2 Vide *Expressed Oils.*

3 This nitrate is prepared by dissolving, without heat, 6 parts of mercury in 7½ of nitric acid, sp. grav. 1·38.

city[1]: an effect which may be owing to the oil forming a coating to the skin, so that it cannot come directly in contact with the contagion. Frictions with it are useful in ascites.[2] It is, however, more generally used as a vehicle for more active substances, in the formation of embrocation: thus, it is an excellent solvent of opium, which can, through its means only, be used in frictions with any advantage.[3] It is also used as an injection in gonorrhœa, and as an adjunct to glysters in dysentery and intestinal abrasions. It is extensively used in pharmacy, in the composition of ointments, cerates, and plasters.

The dose of olive oil is from f℥j. to f℥j., triturated with mucilage, or mixed with water by means of a few drops of solution of potassa. In cases of poisons or of worms, as much may be given as the stomach can bear.

OPIUM. See *Papaver.*

OPOPONAX. *De Candolle.*

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.
G. novum. Fruit elliptical, compressed, flat. *Petals* involute, entire.
Species —. O. *Chironium.*[4] Opoponax, or Rough Parsnep. *Med. Bot. 3d edit.* 122. *t.* 47.
Officinal. OPOPONAX, *Lond. Dub.* Opoponax.

Syn. Opoponax (*F.*), Pannax gummi (*G.*), Opoponace (*I.*), Opopanaco (*S.*), Gawsheer (*Pers.*), Iáwesheer (*Arab.*).

This is a perennial plant, a native of the south of Europe, flowering in July. The root is as thick as the human arm, branched, of a yellow colour, and covered with a tuberose bark: the stem rises about five feet in height, the thickness of a man's finger, round, striated, scariose at the base, angular at the summit, and shining: the radical leaves are simple, cordate, and crenated; those of the stem, ternate, and quinate, with the terminal leaflet cordate and very large: the whole are petiolate; the petioles sheathing, and the leaflets hairy on the under surface; the umbelliferous branches are very smooth; first alternate, erect; then two, three, or four together, in a sort of whorl, two or three inches long, with one or two spathaceous leaflets towards the middle or at the top; the universal umbels have seven or eight rays, an inch long,

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1 *Reflections on the Commerce of the Mediterranean,* p. 64.

2 Lord Bacon, speaking of Inunction, says,—"Ante omnia igitur usum olei vel olivarum vel amygdali dulcis, ad cutem ab extra unguendum, ad longævitatem conducere existimamus." *Opera,* fol. 1665. p. 536.

3 The nostrum called *Roche's Embrocation,* for hooping-cough, consists of olive oil, with about half its quantity of the oil of cloves and oil of amber.

4 Ὀποπάναξ Dioscoridis.

of a yellowish-green colour: both the involucres and involucels consist of from four to six very short leaflets, frequently permanent. The fruit is flat.

In the Levant, where this plant grows, the milky juice which exudes from incisions made in the roots, and dried in the sun, forms the opoponax of the shops. That which is obtained from plants grown in France contain scarcely any resin. It is imported from Turkey and India in chests, and is sometimes in tears or drops, but more usually in irregular lumps.

Qualities.—Opoponax has a strong disagreeable smell, and a bitter, acrid taste. The masses are of a reddish-yellow colour, speckled with white on the outside, paler within, and frequently variegated with large white pieces. Its specific gravity is 1·622.[1] It appears to be a compound of gum 33·40, resin 42, starch 4·20, extractive 1·60, wax ·30, malic acid 2·80, a trace of caoutchouc, essential oil 5·90, and woody fibre 9·80 in 100 parts.[2] When triturated with water, about one half of it dissolves, forming an opaque, milky solution, which deposits on standing a portion of resinous matter, and becomes yellowish. Alcohol acts feebly on it; and in distillation, either with spirit or with water, the odour of the opoponax is very strongly communicated to the fluids, but scarcely any oil is obtained in a separate state.

Medical properties and uses.—This gum resin is regarded as antispasmodic and emmenagogue, and as such has been used in hysteria and chlorosis; but it is very seldom ordered. The dose may be from grs. x. to ʒss.

ORIGANUM. *Spec. Plant. Willd.* iii. 132.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.

G. 1116. *Strobile* four-cornered, spiked, collecting the calices. *Corolla* with the upper lip erect and flat, the under three-parted, with the segments equal.

Species 10. O. *vulgare.* Common Marjoram. *Med. Bot. 3d edit.* 344. *t.* 123. *Smith, Flor. Brit.* 639. *Eng. Bot.* 1143.

Species 15. O. *Majorana.* Sweet Marjoram. *Med. Bot. 3d edit.* 345. *t.* 124.

1. ORIGANUM VULGARE.[3]

Officinal. ORIGANUM, *Lond.* OLEUM EX HERBA, *Dub.* Common Marjoram leaves.

Syn. Oriang (*F.*), Dort, Wohlgemuth (*G.*), Moriolein (*Dutch*), Meiran (*Dan.*), Mejram (*Swed.*), Majeran (*Pol.*), Origàno (*I.*), Origano Sylvestre (*S.*), Mange rona (*Port.*).

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[1] *Brisson.* [2] *Pelletier, Ann. de Chim.* lxix. p. 90.

[3] Σαμψυχον Dioscoridis.

This plant is indigenous and perennial, growing on dry, chalky, and gravelly hills, flowering from July to September. The root is creeping and fibrous, sending up erect, branching, trichotomous, tetragonous stems, about eighteen inches in height, downy, and of a purplish hue. The leaves are ovate, entire, somewhat hairy, ciliated, punctured, and of a deep yellowish green colour. The flowers are in terminal panicles, of a pink purple or rose colour, and furnished with ovate, sessile, brownish red bractes. The calyx is tubular, toothed; the segments being nearly equal: the corolla is funnel-shaped, with the upper lip bifid and obtuse, and the under trifid, blunt, and spreading. The filaments are furnished with double anthers, and the style is filiform, with a bifid reflected stigma.

Qualities.—The odour is agreeable and aromatic, and the taste warm and pungent, much resembling thyme. In distillation with water it affords a very acrid, penetrating, volatile oil, on which its qualities depend.

Medical properties and uses.—Common marjoram is regarded as tonic, stomachic, and emmenagogue. It was formerly used in debilities of the stomach; but is now neglected. The dose is from grs. x. to ℈j., in powder.

Officinal preparation.—*Oleum Origani*, L.

2. ORIGANUM MAJORANA.[1]

Officinal. ORIGANI MAJORANÆ HERBA, *Edin. Dub.* Sweet Marjoram.

Syn. Marjolaine (*F.*), Majoran (*G.*), Maggiorana (*I.*), Origano (*S.*), Mirzunjoosh (*Arab.*), Marroo (*Tam.*).

This is an annual plant, a native of Portugal and Syria; but cultivated in our gardens for culinary and medicinal purposes, and flowering in July and August. The root is long, brown and fibrous; the stems numerous, woody, branching, and rising a foot and a half in height. The leaves are downy, entire, ovate, petiolate, and of a pale green colour. The flowers are small, white, appearing successively among the bractes, which are numerous, and form roundish, compact, terminal spikes. The calyx is tubular, five-toothed, with the teeth acute; the corolla funnel-shaped and bilabiate; the upper lip erect and roundish; the lower cut into three-pointed segments.

It is cut for medicinal use when it begins to flower, in July.

Qualities.—The odour is pleasant, and the taste moderately warm, bitterish and aromatic. Both alcohol and water

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[1] Ορουγανος Dioscoridis.

extract the virtues of sweet marjoram; and, in distillation with water, it yields a large portion of volatile oil, which, on being long kept, becomes solid.

Medical properties and uses.—Sweet marjoram is tonic, and was formerly regarded as possessing errhine powers. It is scarcely ever used except as a culinary herb, or as an adjunct to cephalic snuffs, to which, however, it adds no efficacy.

OSSA. Bones. *Edin. Dub.*

Syn. Des Os (*F.*), Knocken (*G.*), Ossi (*I.*), Huesos (*S.*).

The bones of animals are composed of earthy salts, gelatine, albumen, and oil. According to the analysis of Fourcroy and Vauquelin, the components of ox bones are, in 100 parts, 51 of animal matter, 37·7 of phosphate of lime, 10 of carbonate of lime, and 1·3 of phosphate of magnesia. Besides these, M. Hatchett detected sulphate of lime, and Berzelius some fluate of lime, in bones.

OSTREA. *Syst. Nat. Gmelin.* vi. 3315.

D. 2. Mollusca; Cl. 4. Acephala. *Ord.* 1. Testaceæ. *Cuvier.*

G. 313. *Animal* Tethis. *Shell* bivalve: the valves unequal, and somewhat eared. *Hinge* toothless, but furnished with an ovate hollow cavity, with lateral transverse furrows. *Vulva,* or anus, *none.*

Species 105. O. *edulis.* The common Oyster. *Pennant's British Zoology,* iv. 102. *t.* 62.

Officinal. TESTÆ, *Lond.* The shells.

Syn. Ecailles de Huîtres (*F.*), Austerschaalen (*G.*), Conchiglia d' Ostrica (*I.*), Cascara (*S.*).

This well-known shell-fish inhabits the European and Indian oceans throughout; and is particularly plentiful on the British coasts, which were early famed for producing the best oysters to supply the stews of ancient Rome, in the most luxurious period of its history.[1] They are naturally attached to shelving rocks; but for the facility of always obtaining them for the purposes of aliment, they are generally laid down near the shore. They are hermaphrodite, and throw out a spat in spring, which gradually enlarges to a perfect oyster. The nature of the shell in some degree, and the taste and goodness of the fish, depend on the soil of the bed. They are tender and friable on a calcareous bottom, thick and solid on rocks, more glutinous on marle, and oily and luscious on a slimy bed. The green colour of those fed in pits on the coast of Holland has been supposed to be owing to copper; but it arises from

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[1] Sergius Ovata was the inventor of stews for oysters among the Romans. *Pliny,* lib. xiv. cap. 54.

a species of conferva which cover those stagnant pools.[1] The best oysters on the British shores are found at Purfleet, the worst near Liverpool. The oyster, when good, is very digestible and nutritious, particularly when eaten raw; and may form an article of food for the phthisical, and convalescents. When they are sick, which is known by a black substance on the fringe or fin, or by a very milky appearance of it, they are unwholesome. The shells only are officinal.

Qualities.—Oyster-shells consist of alternate layers of carbonate of lime and an animal matter, supposed to be coagulated albumen. When thrown into a fire, they emit a great deal of smoke, the animal matter is destroyed, the carbonic acid dissipated in the form of gas, and pure lime remains.

Medical properties and uses.—Oyster-shells are antacid; but as, in their unburned state, they are less so than chalk, and, when burned, differ in nothing from lime, their retention in the list of Materia Medica is unnecessary.

Officinal preparation.—*Testæ præparatæ*, L.

OVIS. *Syst. Nat. Gmelin.* i. 197.

D. 1. Vertebrata. Cl. 1. Mammalia. *Ord.* 7. Ruminantia. *Cuvier.*

G. 31. *Horns* concave, rough, inclined outwards, and spirally twisted. *Cutting Teeth* eight in the lower jaw. *Tusks* none.

Species 1. O. *Aries.*[2] The Sheep. *Buffon, Hist. Nat.* v. *p.* 1. *t.* 1, 2.

Officinal. SEVUM, *Lond.* ADEPS OVILLUS, *Edin. Dub.* Mutton suet.

Syn. Graisse de Mouton (*F.*), Hammeltalg (*G.*), Grasse duro (*I.*), Grassa (*S.*), Aatoo kalupoo (*Tam.*), Lemak (*Malay*), Elloomusstail (*Cyng.*), Addjavuppa (*Sans.*).

The sheep is too well known to require any description. It is an inhabitant of almost every climate, and delights in dry, saline, moderately elevated and warm pastures. It is the most innocent, simple, and timid of quadrupeds; scarcely ever living beyond fourteen years of age; yet liable to many diseases. There are several natural varieties of the sheep in the British Islands, the largest of which is found in Lincolnshire, and the smallest in Zetland; and the number of these is much increasing by the cross breeds, which, for the improvement of the wool and flesh, are annually effected. Mutton is less dense than beef, very digestible and wholesome, and is at its greatest perfection when about five years old. It is very much im-

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[1] *Beckman's Observations. Phil. Mag.* vi. 97. In Scotland, oysters laid down to feed near the salt-works on the shore attain a large size, and a great richness of flavour; they are called *Pandoors*, and are much esteemed.

[2] Προβατον *Aristot. Hist. Animal.* v. cap. 11.

proved by the castration of the animal, and is then called wether-mutton. The broth made of it does not agree so well as light beef tea, or veal-tea, with delicate and weakened stomachs; but it forms an excellent emollient enema, in cases of ulceration, or abrasion of the rectum, and that state of the bowels of infants which occasions green stools and aphthæ.[1] The suet, which is the officinal part of the animal, is chiefly obtained from about the kidneys and loins.

Qualities.—Suet is the most consistent of the real animal fats. It is white, has some degree of brittleness, is inodorous, and requires a temperature of 127°. Fahrenheit to melt it. When distilled, it yields a large portion of oleic and margaritic acids. In other respects, it agrees with the other animal fats. (See the qualities of fat under *Sus scrofa.*)

Medical properties and uses.—Like the other fats, suet is emollient. It is sometimes boiled in milk, in the proportion of ℥ij. of the suet to O j. of milk; and a cupful of the mixture may be administered in chronic diarrhœa, when there is much acrimony of the contents of the bowels; but its principal use is to give consistence to ointments and plasters.

OVUM. See *Phasianus.*

OXALIS.[2] *Spec. Plant. Willd.* ii. 772.

Cl. 10. *Ord.* 5. Decandria Pentagynia. *Nat. ord.* Oxalideæ.

G. 918. *Calyx* five-leaved. *Petals* connected by claws. *Stamens* unequal, the five shorter exterior ones connected at the base. *Capsules* opening at the corners, five-cornered.

*** *Leaves ternate, scape one-flowered.*

Species 25. O. *Acetosella.* Wood-sorrel. *Med. Bot. 2d edit.* 563. *t.* 201. *Smith, Flor. Brit.* 491. *Jacquin's Oxalis,* 114. *t.* 80. *f.* 1. *Lindley's Synopsis,* 59.

Officinal. ACETOSELLA, *Lond.* Wood-sorrel.

Syn. Oseille des Bucherons (*F.*), Sauerklee (*G.*), Zuurklaver (*Dutch*), Skovsyne (*Dan.*), Harsyra (*Swed.*), Szezawik (*Polish*), Luggiola Acetosa salvatica (*I.*), Oxalide acederilla (*S.*), Trevo azedo (*Portug.*).

This is an indigenous perennial plant, found in woods, under hedges, and other shaded places, and flowering in April and May; the root is horizontal, toothed, fleshy, and of a reddish colour. The leaves are all radical, ternate like the trefoil, and petiolate; with the leaflets obcordate, very entire, hairy, of a yellowish green colour, and purplish un-

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[1] The milk of the ewe is seldom used either as aliment or medicine. It contains more cream and less whey than cow's milk, but the butter yielded by it never acquires a proper consistence. It is made into cheese in Scotland, which is bitterish; and, when old, warm, biting, and resembling Parmesan cheese in flavour.

[2] Ὀξαλις Dioscoridis.

derneath. The scape or flower-stalk is furnished with two scaly bractes, placed about an inch and a half beneath the flower, which is subnutant, delicate, and of a flesh-colour streaked with red. The calycine leaflets are oblong, oval, acute, ciliated, and purple at the tip. The corolla is bell-shaped; with the claws of the petals upright, and the borders obovate, rounded, and spreading: the filaments are somewhat connate at the base, and furnished with oblong, incumbent anthers; and the styles smooth, rising from an ovate germen. The capsule is membranous, and contains two seeds in every cell. Each seed is invested with a fleshy white tegument, resembling an aril, which is, at first, smooth and closed on every side, but at length, opening at the apex elastically, it rolls back and throws off the seed with considerable force.[1]

Qualities.—This plant is inodorous, and has a pleasant acidulous taste. The expressed juice reddens vegetable blues, coagulates milk, and instantly precipitates lime from its solutions. Its active principle is binoxalate of potassa, which is obtained crystallized from the expressed juice, and sold in the shops under the name of *Essential salt of lemons.*[2] The same salt may be formed by cautiously dropping a solution of potassa into a saturated solution of the oxalic acid, obtained from sugar by the action of the nitric acid; the binoxalate precipitates as soon as the proper quantity of alkali is added.[3] It consists of two equivalents of oxalic acid $=72{\cdot}48+1$ of potassa $=47{\cdot}15+7$ of water $=63=192{\cdot}63$. It crystallizes in small rhomboids.

Medical properties and uses.—Wood-sorrel is refrigerant and antiseptic. Boiled in milk it forms a pleasant whey, which may prove a useful refrigerant in fevers, as may also the expressed juice, or the superoxalate obtained from it diluted with water: but although they are much extolled in inflammatory, bilious, and putrid cases, by the Continental physicians, yet their place is well and easily supplied by lemon-juice, or the citric acid, dissolved in water. The recent herb, eaten as a salad, may be serviceable in scorbutic affections.

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[1] *Gærtner de Fructibus,* ii. 152. t. 113. fig. 5.

[2] This salt is prepared on the Continent by the following process:—The juice is allowed to subside after being slightly heated, and then clarified by adding to it water, in which a small portion of fine clay is suspended. This clarified juice is next boiled till a pellicle forms on its surface, and put aside for a month to crystallize; the operation being repeated until the whole of the salt is obtained, when it is purified by a second crystallization.—*Annales de Chimie,* xiv. 7. The essential salt of lemon of the shops is generally one half bitartrate of potassa.

[3] *Crell's Annals,* (trans.) i. 107.

PAPAVER. *Spec. Plant. Willd.* ii. 1144.

Cl. 13. *Ord.* 1. Polyandria Monogynia. *Nat. ord.* Papaveraceæ.

G. 1015. *Corolla* four-petalled. *Calyx* two-leaved. *Capsule* one-celled, opening by pores under the persistent stigma.

* * *With smooth capsules.*

Sp. 5. P. *Rhœas.* Corn or Red Poppy. *Med. Bot. 3d. edit.* 387. *t.* 139. *Smith, Flora Brit.* 567. *Eng. Bot.* 645.

Sp. 7. P. *somniferum.* White Poppy. *Med. Bot.* 3*d edit.* 376. *t.* 138. *Smith, Flora Brit.* 568.

1. PAPAVER RHŒAS.[1]

Officinal. RHŒAS, *Lond.* PAPAVER RHŒAS; PETALA, *Dub.* Petals of the Red Poppy.

Syn. Coquelicot (*F.*), Klappenrose (*G.*), Klapperroos (*Dutch*), Klapperrose (*Dan.*), Kornros (*Swed.*), Papavero rosolaccio (*I.*), Adormidera sylvestre, Amapola (*S.*), Papoileira (*Port.*).

This species of the poppy is an indigenous annual, growing in the greatest abundance in corn-fields and waste places, and flowering in June and July. Its geographic situation extends from 60° N. lat. towards the tropics; but it is not found in America. The stem rises about a foot in height, is branched, and every where furnished with stiffish, horizontally spreading hairs. The leaves are sessile, pinnatifid, sometimes doubly so, serrated or cut, and generally hairy. The flowers are solitary, on slender, hairy peduncles; the calyx consists of two ovate, rough, concave leaves, which fall before the petals expand: the petals are four, large, roundish, unequal, and spreading, of a full, bright scarlet-colour, and sometimes marked with a black spot at the base. The germen is ovate, smooth, with a convex, sessile, shield-like stigma, scalloped on the edge, having many purple-coloured rays; and becomes an urn-shaped capsule.[2]

The petals must be gathered when they begin to blow, as they very soon drop after they are fully expanded.

Qualities.—They have a faint, narcotic odour, and a mucilaginous, very slightly bitter taste. They yield their colouring matter to warm water; and on this account only are used, as they cannot be said to possess any narcotic properties. The capsules, however, of every species of poppy contain opium; and from the red, it has actually been procured for medicinal purposes, both by Boulduc[3] and Dr. Alston[4]; but the quantity is too small to make it an object of importance.

Officinal preparation.—*Syrupus Rhoeados*, L. D.

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[1] Ῥοιὰς Theophrasti et Dioscoridis.

[2] This form of capsule easily distinguishes it from Papaver *dubium*, which has a long, slender capsule, but in other respects closely resembles the corn poppy.

[3] *Mém. de l'Acad. de Paris*, 1712.

[4] *Alston's Mat. Med.*

2. PAPAVER SOMNIFERUM.[1]

Officinal. OPIUM, PAPAVER, *Lond.* PAPAVERIS SOMNIFERI CAPSULÆ. OPIUM, *Edin.* CAPSULARUM SUCCUS PROPRIUS CONCRETUS; OPIUM; CAPSULÆ MATURÆ, *Dub.* Poppy capsules or heads, and Opium.

Syn. Capsules des Pavots blancs; Opium (*F.*), die Köpse des Weissen Mohns, Mohnsaft (*G.*), Wittamnu Hewl, Turks Heulzap (*Dutch*), Valmuesaft (*Danish*), Wallmo Opion (*Swedish & Russian*), Capi del Papavero; Oppio (*I.*), Adormideras; Opio (*S.*), Afeeoan (*Arab.*), Affion (*Turkish*), Afiun (*H.*), Jya-Pien (*Chinese*), Abinie (*Tam.*), Ufyoon (*Malay*), Sheerkhushah (*Pers.*), Abim (*Cyng.*), Apium (*Jav.*), Caruppa (*Malab.*).

The somniferous or white poppy is a native of Asia; and although it is found growing wild in the southern parts of Europe, yet there is every reason for thinking that its seed must have been carried to these parts. It was very early cultivated in Greece, perhaps, at first, solely for the sake of its seed, which was used as food. It is extensively cultivated in most of the states of Europe[2], in the present age, not only on account of the opium, for which it is reared in Turkey, Persia, and India, but also on account of the capsules, and especially for the bland oil obtained from the seeds. It is an annual plant, flowering in June and July, in Europe; and in February, in India. The stem is glaucous, coloured, smooth, erect, and round; rising to the height of three or four feet,

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[1] Μηκων ἥμερος Theophrasti et Dioscoridis. Homer notices the somniferous poppy, under the name of μηκων, as a garden plant: and it is said to be nourishing, by Hipprocates; an expression which is explained by the fact that, at this day, in Persia, when the plants rise too thick in the fields in which they are sown, those which are taken up, when they are young, are used as pot-herbs. The following are the names by which the poppy is known in the greater part of Europe:—*Pavot de jardin* (F.), *Papavero domestico* (I.), *Mohn, Garten Mohn, Magen* (G.), *Dor midera, Cascak* (S.), *Mák* (Boh. & Hung.), *Maczek* (Polish), *Maan* (Flemish), *Valmue* (Danish). In Asia its appellations are *Khashhash* (Arab.), *Kooknan* (Pers.), *Casa Casa* (Tam.), *Post* (Sans.), *Abin Atta* (Cyng.), *Ying-suh* (Chinese), *Kes, Reisjun* (Japan).

[2] In England, it has been cultivated for the purpose of obtaining opium. Mr. Ball, in 1796, received a premium from the Society for the Encouragement of Arts, for a specimen of British opium little inferior to the Oriental.—*Transactions of the Society of Arts*, xiv. 260—270. Messrs. Cowley and Stains, in 1823, collected 196 lbs. of opium, which sold for 30*s.* 6*d.* per lb., from little more than 12 acres of land. But it has been most successfully cultivated by Mr. Young, who found that the best and most lucrative mode of cultivating the poppy in this country is in wide drills, about 12 inches between the rows. The plants sown about the middle of April are ready for bleeding about the middle of July. The subsoil should be sand, or at least pervious. The instrument used by Mr. Young for bleeding the capsules is a double-bladed, convex-edged knife, covered with sealing wax, except so much of the edge as is necessary to make the incisions. These are made vertical, then obliquely; and the proper time for this operation is a week after the petals fall. When these scarifications are finished, he slices off the capitulum or stigma, and collects the milky juice that exudes. The juice is collected on a hair brush, known to painters by the name of a sash-tool, rounded a little at the point. This, when it is

when in a favourable situation.[1] The leaves are large, simple, obtuse, lobed, and crenated, and embracing the stem on which they are alternately placed. The flowers are large and terminal; the calyx is formed of two smooth, ovate, bifid, concave leaves, that drop on the expanding of the petals; which are four in number, large, roundish, entire, somewhat undulated, and white; occasionally of a silver-grey colour, and tinged with violet at the base. The filaments are very numerous, slender, shorter than the corolla, and support erect, compressed anthers; and the germen, which is globular and smooth, is crowned with a many-rayed stigma. The capsule, which stands on a short pedicel, is globular when well grown, smooth, glaucous, from two to four inches in diameter, a little flattened at the top and bottom, and crowned with the persistent stigma, the segments of which stand erect, and have an elegant appearance. The seeds are small, white, or grey, reniform, and very numerous; and escape, when ripe, through small openings under the points of the stigma.

All the parts of the poppy, except the seeds[2], contain a white, opaque, narcotic juice; but it abounds more in the

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charged with juice, is scraped on the side of a tin flask, fastened to the breast of the gatherer.

Mr. Young supposes, that by sowing the poppies between early potatoes, the following may be the probable return—at least such was the result of his experiments for one acre:

56 lbs. of opium, at 36*s.* *per* lb.	-	£100	16	0
36 bolls of early potatoes, at 24*s.*	-	43	4	0
250 lbs. of oil, cold-drawn, at 1*s.* 6*d.*	-	18	15	0
125 ——— warm, at 6*d.* -	-	3	2	6
500 oil-cakes, at 18*s.* *per* 100 -	-	4	10	0
		£170	7	6
	Expenses	60	0	0
	Profit	£110	7	6

But I will suppose this to be over-rated one half. See *Edin. Philosoph. Journ.* vol. i. p. 258—270. See also a valuable paper on this subject in the *Quarterly Journ. of Science,* vol. iv. p. 69. My friend Mr. Laws, of Harpenden, Hertfordshire, raised some opium last year equal to any Turkey which I have ever examined. It is, however, improbable that opium will ever be made in large quantities in England.

In Bengal, the seeds are sown in quadrangular areas, and the intervals formed into channels for conveying water to each area.

1 Professor Murray, in his excellent *Apparatus Medicaminum,* has committed a ludicrous mistake in quoting from Chardin;—he says, "assequitur subinde stirps magnitudinem quadraginta pedum in Persia, et capsulæ interdum in Arabia ad amplitudinem triginta quinque unciarum capacem perveniunt." The poppies in Persia and Arabia are not larger than those in England.

2 The seeds are not narcotic, but alimentary; thence the appellations *almum, cereale, vescum,* given to the poppy by the ancient poets.

capsules: thence these are the only officinal parts of the plant, and for them chiefly is the plant cultivated in this country. They are gathered as they ripen; and as this happens at different times, there are annually three or four gatherings. It would be better, however, to gather them whilst they are yet green, as in this state they contain more proper juice than when ripe. They are brought to market in bags, each containing about 3000 capsules, and sold to the druggists.[1]

The milky juice of the poppy, in its more perfect state, is extracted by incisions made in the capsules, and inspissated; and in this state forms the opium of commerce.[2] The period for commencing this operation is when the petals fall and the capsule assumes a whitish hue. The mode of obtaining it appears to have been nearly the same in the time of Dioscorides as it is at this day. The plants, which should be six inches apart during their growth, are carefully watered and manured, the watering being more profuse as the period of flowering approaches, and until the capsules are half grown, when it is discontinued, and the collection of the opium commences. At sunset, longitudinal incisions are made upon each half-ripe capsule[3], with an instrument which is called *nahrea* in India, and which has five sharp points. The incisions pass from below upwards, and do not penetrate to the internal cavity. The night dews favour the exudation of the juice, which is collected in the morning, before the dew is dispersed, by old women and children, who scrape it from off the wounds with a small iron scoop, and deposit the whole in an earthen pot[4], where it is worked by wooden spatulas in the sunshine, until it attains a considerable degree of spissitude. The collection is repeated every second day for a fortnight or three weeks. The whole of the collections are then formed by the hand into cakes, which are laid in earthen basins to

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1 The London market is chiefly supplied from Mitcham in Surrey. The average price of each bag, containing 3000 capsules, is about 4*l.* 10*s.*—*Stevenson's Survey*, 382.

2 In tracing the origin of the name *Opium*, we find that the ancient inhabitants of India and of Egypt, and the Arabians, called the inspissated juice of the capsule of the poppy, *affion*; the Persians, *afiuun*, or *abé-oon*; the Moors, *affiun*; and by the modern Turks it is termed *affioni*. The Greeks named it *opion*, a word derived from *opos*, a juice. Οπιον απο του οπου, adding sometimes, *μηκωνος*, the juice of the poppy, or *οπος των κωθειων*, the juice of the capsule. Some suppose that the Nepenthes of Homer (Odyssey, iv. 220. v.) was opium; but this opinion is completely disproved by Dr. Christen, in his excellent work, entitled, *Opium Historice, Chemice, atque Pharmacologice Investigatum.* Vindobonæ, 8vo. 1820.

3 In India, the incisions are made in the capsules seven days after the petals fall, when the capsule begins to harden.

4 In some parts it is collected in a small brass pot, or a cocoa-nut shell, containing a little linseed oil.

be further exsiccated, when it is covered over with poppy or tobacco leaves.[1] Such is the mode followed in India, and according to Kœmpfer's account nearly the same is practised in Persia[2]: and when the juice is drawn in a similar manner in this country, and inspissated, it has all the characters of pure opium.[3]

Opium is brought to this country in chests from Turkey and India.[4] The *Turkey opium* is raised in Anatolia, and exported chiefly from Smyrna. It is in flat pieces, covered with leaves, and the reddish capsules of some species of *Rumex*, which is considered an indication of its goodness, as the inferior kinds of opium have none of these capsules adhering to them. Turkey opium generally contains about one fourth part of impurities. *East Indian opium* is raised chiefly in Malwa, in Bahar, and Benares: it is in round masses, covered with the petals of the poppy in successive layers, to the thickness nearly of one fourth of an inch. Mr. Kerr relates, that at Bahar it is frequently adulterated with cow-dung, the extract of the poppy procured by boiling, and various other substances. In Malwa[5], it is mixed with oil of Sesamum, which is often one half of the mass: ashes, the dried leaves of the plant, and catechu, are also used. It is also adulterated with the aqueous extract of the capsules, the

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[1] *Med. Observ. and Inquiries*, v. 317.

[2] According to Kœmpfer, the produce of the first incisions is of a pale yellow, and called *gobaar* in Persia; and is esteemed much superior in strength and goodness, in every respect, to the other collections.

[3] When a current of wind or a cloudy day prevents the formation of dew, the incisions of the scarifications in the capsule are closed, and little juice flows. On the contrary, when the dew is heavy, and the flow of sap great, the opium is apt to fall off and drop from the incisions, and be wasted. In moderate dews the quantity of opium is greatest, namely, gr.j. of solid opium from each quadruple incision; it is exteriorly *rose red*, interiorly *reddish white*.

When the dew is considerable it also does harm by separating the soluble from the insoluble parts of the opium. The scrapers are in Malwa dipped in oil to prevent such an effect, but it injures the flavour of the opium. When water is used for this purpose, a dark reddish or blackish brown solution takes place, which evaporates into what is termed Paseivà in Bengal; it is either mixed with the mass of opium, or covers it as a paste.

When opium has been rapidly dried in the shade, it has a coppery or reddish-brown colour; is translucent in thin plates, with a gallstone *yellow* colour, and slightly granular texture. It has considerable adhesiveness; its odour is heavy, narcotic, but not unpleasant. In this condition it is termed *standard* or *awcwal* opium in Bengal. When it has been inspissated slowly in deep hollow vessels, it consists of irregular granules, or nodules, and is termed raw or *kacna* opium.

[4] The Turkey opium is, nevertheless, the produce of Persia. The India opium was for a long time regarded as the best; but the Persian, or Turkey opium, as it is called, is now justly preferred.

[5] In Malwa about 350,000 pounds, avoirdupois weight, of opium, are annually produced, 210,000 of which are for exportation.—*Malcolm's Mem. on Central India*, vol. i. p. 8.

extracts of Chelidonium *glaucum*, Lactuca *virosa*, and Glycyrrhiza *glabra;* and sometimes with gum arabic, tragacanth, aloes, and many other articles. Great pains, however, have lately been taken by Dr. Adams of Calcutta in improving the preparation of East Indian opium; and, except in point of strength, it is equal to the best Turkey opium. An inferior opium from Egypt is sometimes found in the market. Excellent opium has been lately produced in England, as I have already noticed.

Opium is regarded as bad, when it is either very soft, greasy, light, friable, of an intensely black colour, or mixed with many impurities. A weak or empyreumatic odour, a slightly bitter or acrid, or a sweetish taste, or the power of marking a brown or black continuous streak, when drawn across paper, are also symptoms of inferior opium.

Qualities.—1. *The dried capsule* of the poppy is inodorous, and nearly insipid, a slight degree of bitterness only being perceptible when it is long chewed. Water by coction extracts its virtues; and when the decoction is evaporated, an extract is obtained, with properties similar to opium, but much less powerful.

2. *Turkey opium* has a peculiar, strong, heavy, narcotic odour, and a bitter taste, which is accompanied with a sensation of acrid heat, or biting on the tongue and lips, if it be well chewed: and if long kept in the mouth of a person unaccustomed to chew it, blistering is produced. Its colour, when good, is a reddish brown, or fawn colour; its texture compact and uniform. Its specific gravity is 1·336. When soft, it is tenacious; but when long exposed to the air, it becomes hard, breaks with an uniform, shining fracture, is pulverulent, and affords a yellowish brown powder; which is again aggregated by a heat so low as that of the hand. It is inflammable, and partially soluble in water, vinegar, lemon-juice, wine, alcohol, and ether. By long boiling in water under exposure to the air, its narcotic powers are impaired; yet nothing rises with water, when it is distilled with that fluid.[1] When carefully triturated with distilled water, it gives solutions of various specific gravity; thus ℥viij. of one specimen rubbed down with two pints of water, yielded a solution of sp. gr. 1·039; of another specimen a solution of sp. gr. 1·038 was procured; whilst the same quantity of Egyptian opium afforded a solution of sp. gr. 1·052; yet this yielded less Morphia than either of the former specimens. When treated with hot water, about five parts in twelve of

[1] Beaumé, however, asserts that the odorous part of the opium is an oil.

the opium are dissolved and retained in solution, nearly six parts are simply suspended, and rather more than one part remains perfectly insoluble, of a viscid, plastic nature, somewhat resembling the gluten of wheat, but of a dark colour. Bucholz regarded this as caoutchouc; according to Proust it contains wax; and Gren supposed it to be analogous to gluten. By digesting alcohol on this substance, I found that it dissolved a small portion of it, acquired a reddish yellow colour, and became milky when added to water. Sulphuric ether digested on it, broke it down, and dissolved a portion of it, forming a yellowish tincture, which when evaporated on water left resin, a bitter extractive, and some acicular crystals of a salt, which Derosne, erroneously, supposed to be the narcotic principle. The insoluble part, after the action of the ether, was subjected to a set of comparative experiments with the gluten of wheat, when it afforded similar results with the majority of the tests employed. Hence this part of Turkey opium appears to be a modification of gluten, combined with resin, extractive, and peculiar salts.

3. *East Indian opium* has a strong, empyreumatic smell, but not much of the peculiar, narcotic, heavy odour of the Turkey opium. The taste is more bitter, and equally nauseous, but it has less acrimony. It agrees with the Turkey opium in its other sensible qualities, except that its colour is blacker, and its texture less plastic, although it is as tenacious. It is more friable, and when triturated with water no insoluble, plastic residuum is left, but it is altogether taken up; eight parts in twelve being dissolved, and the remainder suspended in the fluid. Very little of it is brought to England, its consumption being confined to China and other oriental countries.

The aqueous solutions of both kinds of opium are transparent when filtered, that of the East Indian having the deepest brown colour; both redden litmus paper; neither is decomposed by alcohol, but both are precipitated by solution and tincture of iodine, the carbonates of potassa and of soda, by pure ammonia, and by chloride of barium: precipitates are also formed by solutions of the bichloride and nitrate of mercury, the acetate and diacetate of lead, the nitrate of silver, the sulphates of copper, of zinc, and of iron: by infusion of galls, and all astringent vegetable infusions: the precipitate, as Dr. Duncan justly observes, resembling more that produced by cinchonin than that by gelatine.[1] The acetate of baryta does not alter the solution of Turkey opium, but it produces a

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[1] *Edinburgh New Dispensatory*, 5th edit. 332.

copious precipitate with that of the East Indian: oxalic acid precipitates both, but the latter more copiously.

No article of the Materia Medica has occupied the attention of chymists so much as opium. I shall detail the more important results of their labours; but I may preface this account by stating, that from the experiments to which it has been submitted, the components of opium appear to be an oily matter, gum, bassorine, resin, bitter extractive; *five peculiar crystallizable salts*, namely, *morphia*, *narcotina*, *codeia*, *meconina*, *narceia*; *two new acids*, the *meconic*, and one not yet named; sulphates of lime and of potassa, alumina, and iron. The salt of potassa appears to be very abundant in the East Indian opium: the Turkish contains, besides, a species of gluten, and a substance resembling caoutchouc.

According to Bucholz, the proportion of *extractive*, in 100 parts of opium, is 35·6; of *gum* 30·4; of *resin* 9; gluten 11·4; substance like caoutchouc 4·8;[1] sulphate of potassa 2, and of sulphate of lime 1; the remainder consisting of an oily or balsamic matter and waste. For a long time nothing more was known: but, as the narcotic power of opium evidently could not depend on any of the above-named principles, some others were to be looked for; and were at length discovered. Derosne, in 1803, asserted that the activity of opium depends on a peculiar salt. He evaporated a watery infusion of opium to the consistence of syrup, and digested the gritty precipitate formed by this evaporation in hot alcohol: as the solution cooled, a salt formed, which by repeated solutions and crystallizations was obtained free from the resin, of a white colour, and in rectangular prisms with rhomboidal bases: these were inodorous, insipid, insoluble in cold water, but soluble in 400 parts of boiling water; soluble in 100 parts of cold, and 24 of boiling alcohol; soluble in hot ether and the volatile oils, but separating as these fluids cooled; and very soluble in all the acids. Given to dogs, it produced the effects of a strong dose of opium; but these were readily relieved by vinegar. In repeating the experiments of Derosne, I obtained a much greater proportion of crystals of this peculiar salt from East Indian than from Turkey opium, which I conceived to militate against his idea of its being the sedative principle, inasmuch as larger doses of that variety of opium than of the Turkey are required to produce its narcotic effect on the system. I had then no opportunities of ascer-

[1] Pelletier ascertained the composition of the *caoutchouc* to be,—Carbon, 87·89 + Hydrogen 12·11 = 100: and that of the *oily matter*,— Carbon, 72·39 + Hydrogen 11·83 + Oxygen 15·78 = 100.—*Ann. de Chim. et Phys.*, i. 197.

taining the power of this salt; but some experiments by M. Orfila[1] demonstrated that, although it exerts a deleterious effect on the animal economy, yet that the symptoms differ from those produced by opium; and even from Derosne's account, it is not so powerful a narcotic as opium itself.[2] My scepticism on this subject was further confirmed by the discovery of M. Sertürner, of Eimbeck in Hanover. The first experiments of this chymist were made public about a year after those of Derosne; but they excited little attention until he published a second memoir in 1817. According to Sertürner, the salt of Derosne is not the narcotic principle of opium; that principle being, according to him, an alkaline salt, which is combined with a peculiar acid in opium, but which he obtained in a separate state. This salt he named *morphium*, and the acid he named *meconic*.[3] Robiquet confirmed the statements of Sertürner regarding the existence of *morphia*[4]; and its narcotic properties are now generally known. The following are the chief modes which have been employed to procure the salts of opium.

1. *Morphia.* To procure this alkaloid, Sertürner precipitated a watery solution of opium by ammonia, dissolved the precipitate in diluted sulphuric acid, precipitated this sulphate again by ammonia, and then boiled the last precipitate in alcohol, and crystallized. Robiquet obtained morphia by making a concentrated solution of opium, which he boiled for a quarter of an hour with a small quantity of magnesia. A greyish precipitate forms, which is to be separated by filtration, washed on the filter with cold water, dried, and then digested for some time with weak spirit, in a moderate heat, in order to separate the colouring matter. The residue is now again to be separated by the filter, washed with a little cold alcohol, and then boiled in a larger quantity of rectified alcohol: on filtering the solution whilst it is yet boiling, morphia, beautifully crystallized, and almost free from colour, is deposited as it cools. By repeating the last part of the operation three or four times, with the residue of the previous boilings, the

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1 *Nouveau Journ. de Méd.* tom. x. p. 154.

2 *Annales de Chimie*, lxv. 270.

3 Mr. Donaldson, surgeon, Stonehaven, is of opinion that the magisterium opii of Dan. Ludwig, noticed in his *Dissertationes de Pharmacia*, the second edition of which was published in 1688, was morphia. It was obtained by dissolving the opium in an acid, and precipitating by an alkali.—*Edin. Journ. of Med. Science*, vol. i. p. 476. Vauquelin has claimed the discovery of morphia and meconic acid for Sequin, who read a paper to the French Institute, on the salt of opium, in 1804; but Sertürner, who made his discovery at the same time, went farther than Sequin.

4 *Annales de Chimie et de Phys.* t. v. p. 276.

whole of the morphia is obtained. The following process, proposed by M. Hottot, is often preferred to that of Robiquet:—Macerate ℥ vij. of opium in a sufficient quantity of cold water to exhaust the residuum, and evaporate the liquors to sp. gr. 1·012; when half cooled, add grs. xxiv½. of ammonia, and allow the precipitate, which is chiefly greasy matter, to fall; then decant, and again add 141 grains of ammonia, and leave the mixture to deposit the precipitate for 12 hours; after which filter, wash the residuum with cold water, and treat it with f ℥xv. of alcohol of sp. gr. .847, and grains 141 of animal charcoal, in a sand-bath; and when the alcohol boils[1], filter. As it cools, the morphia will crystallize. Many other processes have been devised: for that ordered by the Pharmacopœia of the London College, see *Part* III.

The salt, when it is well prepared, is colourless, bitter, inodorous, and crystallized in irregular six-sided prisms with dihedral summits, nearly insipid. It burns like vegetable matter, leaving carbon as a residue; restores, like the alkalies, the colour of reddened turnsole paper, browns turmeric paper, and readily combines with acids, forming neutral salts.[2] It is nearly insoluble in water; not very soluble in hot water, nor even in cold alcohol, nor in ether; but it is readily soluble in the two latter fluids in the boiling state; the salt being again precipitated in crystals as the solutions cool. It is soluble also in oil, both fixed and volatile. As an alkali, it holds the next place to ammonia, having less affinity for the acids than either that salt or magnesia. Its ultimate components are, according to Dumas and Pelletier, 72·02 of carbon, 5·57 of nitrogen, 7·61 of hydrogen, and 14·34 of oxygen, in 100 parts[3]; or, according to Liebeg, of 34 eq. = 208·08 of carbon + 18 eq. of hydrogen + 1 eq. = 14·15 of nitrogen + 6 eq. = 48 of oxygen; making the equivalent 288·23. Morphia, being scarcely soluble in water or in the fluids of the stomach in its uncombined state, does not display in a striking manner its properties when it is administered alone; but these are very striking when it is combined with an acid, particularly the acetic, the citric, the hydrochloric, and

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[1] *Journ. de Pharm.* 475.

[2] The following are the characters of the neutral compounds of morphia which may be medicinally employed. The *acetate of morphia* crystallizes in soft, silky prisms, which are very soluble. The *sulphate* in arborescent or branching crystals, soluble in two parts of water at 60°. The *carbonate* in short prismatic crystals, soluble in four parts of water at 60°. The hydrochlorate in radiated tufts, very soluble in cold water, but scarcely soluble in alcohol.

[3] *Ann. de Chimie,* t. xxiv. p. 185.

meconic; with the latter of which it exists naturally in opium in a state of combination as a bimeconate: and although nearly tasteless when pure, yet the salts which it forms with acids are intensely bitter. Strong nitric acid strikes a blood-red with morphia, and decomposes it, converting it into oxalic acid: with persalts of iron it strikes a blue tint.

2. *Meconic acid* may be obtained in a separate state by various processes.—*a.* By precipitating an aqueous solution of opium by means of acetate of lead, which throws down a meconate of that metal. This is to be well washed with distilled water, and decomposed by passing through it a stream of sulphureted hydrogen gas, filtering and evaporating the fluid. Meconic acid crystallizes in small amber-coloured crystals. *b.* By precipitating an aqueous solution of opium by chloride of barium, washing the precipitate, and then decomposing it with diluted sulphuric acid, which forms an insoluble salt with the baryta, and sets free the meconic acid. To obtain it pure the crystals procured by evaporating the solution are to be combined with potassa, and the meconate thus formed is to be decomposed by hydrochloric acid. Meconic acid has an acid taste, and reaction. It is soluble in water and alcohol; its solutions strike a deep red with the persalts of iron, and an emerald green with sulphate of copper. It is a compound of 7 eq. = 42·84 carbon + 2 eq. hydrogen + 7 eq. = 56 of oxygen, making the equivalent = 100·84. Meconic acid exerts no action on the animal system.

3. *Narcotina* is generally procured in conjunction with morphia, but easily separated by ether, which does not act on morphia, at a temperature of 60°.[1] Narcotina may be readily procured by acting on the residue of opium, exhausted by water, with acetic acid, filtering, and precipitating the solution by liquor potassæ. This precipitate well washed, and treated with boiling alcohol yields crystallized narcotina, which may be purified by re-solution in alcohol and treating it with animal charcoal. When pure, it is colourless, tasteless, inodorous, and crystallizes in flexible, acicular crystals: insoluble in cold water, but soluble in 400 parts of boiling water. It is scarcely soluble in cold alcohol, but dissolves in 24 of boiling alcohol: and very freely in ether, and the fixed and volatile oils. It combines, but slightly, with acids, and forms very bitter salts, easily decomposed. It is readily dis-

[1] To separate morphia from narcotina, Mr. Robertson (*Edin. Journ.* xxxviii. p. 275) recommends to boil the salt with hydrochlorate of ammonia as long as any ammonia is driven off. The morphia is thus formed into the hydrochlorate, whilst the narcotina remains as a white insoluble powder.

tinguished from morphia by staining heated paper like resin, by not reddening nitric acid, nor giving blueness to the per-salts of iron. MM. Majendie and Robiquet have proved that it is the salt obtained by Derosne. The components of narcotina are, carbon 68·88, nitrogen 7·21, hydrogen 5·91, oxygen 18·00, in 100 parts[1]; or, according to Liebeg, of 65 of carbon + 5·5 of hydrogen + 2·51 of nitrogen + 26·99 of oxygen in 100 parts. Robiquet has proposed a mode of preparing an extract free from narcotina, and yet containing morphia. (See *Extractum Opii.*)

In repeating Sertürner and Robiquet's experiments, I obtained from good *Turkey* opium nearly three times the quantity of morphia yielded by the same weight of *East Indian* opium; that from the latter was also more coloured, and in smaller crystals. Although the utmost nicety of manipulation was not attended to in my experiments, yet as both specimens were treated exactly in the same manner, they are sufficient to show the comparative richness of these varieties of the drug in this salt; and the result is certainly in favour of the opinion, that the narcotic property of opium depends on this alkaline salt; and accounts for the fact which has been stated above, that much larger doses of the East Indian than of Turkey opium are required to produce its sedative effect on the system.[2] Mr. Brande procured a larger quantity of morphia from a carefully prepared sample of English opium than from the same weight of Turkey opium.[3] Practitioners and physiologists in this country have made decisive experiments with morphia, to determine its effects on the animal economy; and their results agree with those of MM. Orfila and Majendie.[4] The experiments of the former being made upon dogs, they can be regarded as important only inasmuch as they confirm the opinion, that opium owes its soporific powers to this salt, and displays the comparative activity of the different combinations of the salt. Of the saline compounds he found the acetate the most powerful; but a solution of morphia in olive oil acts with still greater intensity, and with more than double the effect of the aqueous extract of opium. The experiments of M. Majendie, being made on the human subject, are more interesting. He found that a quarter of a grain of acetate of morphia produces the most beneficial effects that can be expected from an anodyne;

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[1] *Ann. de Chimie*, t. xxiv. p. 186.

[2] Samples of East India opium have nevertheless yielded nearly as much morphia as is usually found in Turkey opium.

[3] *Manual*, p. 128.

[4] *Nouveau Journ. de Médecine*, t. i. p. l. 23.

allaying pain, and procuring sleep, without, in any degree, affecting the cerebral functions: and I have been able, from my own experience, to verify this fact. The sulphate acts in a similar manner, but with less energy. The hydrochlorate is as powerful as the acetate, and is more easily and abundantly procured.[1] It is probable that narceia is the product of the process for obtaining it.

4. *Codeia* crystallizes along with hydrochlorate of morphia, in making that salt, in proportions according to the character of the opium. Dr. Christison procured one-twelfth of hydrochlorate of codeia from a specimen of East Indian; Dr. Gregory one-thirtieth from Turkey opium. Pure codeia is in flat, colourless, transparent prisms: water at 60° dissolves 1·26 per cent., at 110° 3·7, and at 212° 5·9: it dissolves in ether. The solution is alkaline; it combines with alkalies, forming crystallizable salts. Codeia is not reddened by nitric acid. It is a compound of 31 eq. carbon$=$189·72$+$20 hydrogen $+$1 nitrogen$=$14·15$+$5 oxygen$=$40 equiv. 263·87 : its crystals contain 2 equiv. of water.

5. *Meconina*[2] is also a white, transparent salt, in acicular crystals, soluble in 200 parts of water at 60°, and 24 at 212° : it is also soluble in ether, alcohol, and the volatile oils. It fuses and sublimes without change, and is neither alkaline nor acid. It is separated by precipitating the aqueous infusion of opium with ammonia, washing the precipitate until it is nearly colourless, then evaporating all the watery solutions to a thickish consistence, and leaving the whole at rest for three weeks. The granular mass is next to be separated from the fluid, pressed and dried with a gentle heat; the result is *Meconina.* It may be purified by dissolving it in boiling alcohol to form crystals, redissolving these in water, and digesting with animal charcoal, filtering whilst hot, and lastly crystallizing by spontaneous evaporation.

6. *Narceia*[3] is found in the aqueous solution of opium, after it has been freed from the morphia and narcotina by ammonia, and the meconate of ammonia which remains has been decomposed by baryta. On boiling the solution to expel the

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[1] I have found that the best mode of preparing the hydrochlorate is to precipitate an aqueous solution of opium, by means of a solution of chloride of barium; hydrochlorate of morphia remains in solution, whilst an insoluble meconate of baryta is thrown down. This is separated from the solution by decantation and the filter. On evaporation, the hydrochlorate crystallizes in radiated or star-like tussocks, which are readily separated from the narcotina and other components of the opium by pressure. By repeated solutions and crystallizations, the hydrochlorate is obtained nearly free from colour.

[2] Discovered by M. Couerbe in 1832.

[3] Discovered by Pelletier in 1832.

ammonia, and evaporating, the crystals which gradually form are Narceia. When purified, they are white, acicular prisms, inodorous, slightly bitter, and pungent; soluble in 375 parts of water at 60°, and 230 parts at 212°; and in hot alcohol: but they are insoluble in ether. They neutralize acids imperfectly; the salts, when concentrated, become blue; and on adding successive portions of water, then violet, rose-red, and ultimately colourless.

Medical properties and uses.—Poppy heads or capsules possess narcotic properties; they are chiefly employed, boiled in water, as fomentations to inflamed and ulcerated surfaces. An extract, which is employed as a substitute for opium, is prepared by inspissating the decoction; and also a syrup, which is used as an anodyne for children, and to allay the tickling cough in chronic catarrh and phthisis. (See *Part* III.)

If we judge from the quantity of *Opium* imported, it is more generally used than any other remedy, the average annual importation exceeding 40,000 lbs.; and the consumption in Great Britain alone being upwards of 16,500 lbs.[1] It appears to have been introduced into the Materia Medica before the time of Hippocrates; but was little employed as an internal remedy until 300 years after his period. It operates —1st. as a powerful and very diffusible excitant, but its primary operation is soon followed by narcotic and sedative effects, in a degree much greater than could be expected from the previous excitement it induces. 2. It acts directly on the nervous system; and when taken into the stomach destroys irritability, and allays pain in the most distant parts of the body, independent of the circulation, and without inducing any change on the composition of the blood. 3. It produces sleep, both by an immediate action on the brain, and its power of allaying irritation. 4. It operates as an antispasmodic. And 5. excites diaphoresis. As the principle on which opium acts is the same all over the body, the topical application of it is capable of producing similar effects, only in a diminished degree, to those resulting from it when it is taken into the stomach. The larger the dose is the more quickly its primary action is extended over the whole habit; and as every part is excited nearly at the same moment of time, the general consequent exhaustion must necessarily more rapidly follow, than when the dose is merely sufficient

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[1] The quantity of opium imported into England from Bengal and other places, from the year 1786 to 1801, amounted to 286,271 lbs.; and the consumption to 247,619 lbs.—*Morewood on Inebriating Liquors*, p. 106.

to induce a degree of excitement scarcely exceeding the powers of the system on which it operates. Hence either the stimulant or the apparently sedative effects of opium may be rendered obvious by the extent of the dose in which it is exhibited; and the early knowledge of this truth might have saved much of the keen controversy which the subject at one period occasioned. In moderate doses opium increases the fulness, the force, and the frequency of the pulse, augments the heat of the body[1], quickens respiration, and invigorates both the corporeal and mental functions, exhilirating even to intoxication[2]: but by degrees these effects are succeeded by languor, lassitude, and sleep; and in many instances head-ache, sickness, thirst, tremors, and other symptoms of debility, such as follow the excessive use of ardent spirits, supervene. In very large doses the primary excitement is scarcely apparent, but the pulse seems to be at once diminished, drowsiness and stupor immediately appear, and are followed by delirium, sighing, deep and stertorous breathing, cold sweats, convulsions, apoplexy, and death. When the dose has been very large, the appearances on dissection are those which indicate the previous existence of inflammation of the stomach and bowels; but no particular appearance of an inflammatory state, or even great fulness of the vessels of the brain are perceived.

On account of its primary excitant influence opium is efficaciously administered in some cases of debility, as, for instance, fevers of the typhoid kind, and intermittents; and, when combined with calomel, to check the progress of gangrene. In typhus opium is given with two intentions, namely, 1. as an excitant, 2. as an anodyne.

For fulfilling the first intention it is given in small doses frequently repeated, as an useful assistant to wine in sup-

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1 It is extraordinary that Dioscorides, Galen, Aurelianus, and many of the ancients, believed that it produced cold.

2 The Turks call opium *afioni*; and in the *teriakihana*, or opium shops of Constantinople, they take it in graduated doses from ten grains to one hundred grains in a day. It is mixed with rich syrup and the inspissated juices of fruit, to render it more palatable and less intoxicating; and is taken with a spoon, or made up into small lozenges stamped with the words *Mash Allah*, literally "The work of God." The Tartar couriers, who travel great distances, and with astonishing rapidity, take nothing else to support them during their journies. (*Dallaway's Constantinople*, 4to. 78.) There is, however, some reasons for supposing that the Mash Allah, or Maslach of the Turks, contains other narcotics, as those of *hemp* and of *lolium*, as well as opium. The Chinese, the Bornese, and the Sumatrans, smoke opium as Europeans smoke tobacco; and do not appear to suffer in health. The *Limum* and *Batany Assei*, who indulge in this practice, "are, notwithstanding, the most healthy and vigorous people to be met with in Sumatra." —*Marsden's History of Sumatra.*

porting the vis vitæ: it proves injurious when local inflammations exist; and, under every circumstance, its employment as an excitant in fever requires much caution. For the purpose of allaying irritation, and obtunding the susceptibility of those morbid impressions which occasion watchfulness, delirium, tremors, and subsultus tendinum, opium is useful when the inflammatory state of the brain has been previously relieved by bleeding and cold applications to the scalp. If the pulse be soft, the skin cool, the face not flushed, the tongue moist, and there is no suffusion of the eyes, its salutary influence is striking. It is to this effect of it that Alibert and others ascribe its power, when moderately used, of rendering the human body less susceptible to different diseases.[1] Some caution, however, is required in its exhibition; for if the heat of the body be much above the natural standard, and the skin dry, opium increases these symptoms, augments thirst, and occasions restlessness. But if moisture be coming on, opium accelerates it, and tranquillity and sleep follow. Hence the propriety of Dr. Currie's advice, not to give the evening dose of opium in fevers till very late, or about one or two o'clock in the morning, when the heat is subsiding; or first to lower the temperature, and excite sensible perspiration by the effusion of cold water, or tepid sponging.[2] It is especially hurtful where there is a disposition to local inflammation of the chest.

Opium very materially assists the bark in curing intermittents, and prevents it from running off by the bowels. When given at the approach of the paroxysm, it sometimes checks its attack, or shortens and renders it milder, and abates the violence of the hot stage, by determining to the surface, and inducing sleep. In acute rheumatism, opium is advantageously given united with calomel and antimonials[3] after bleeding: it is, also, usefully combined with nitre, and always relieves when it determines to the surface; but in order to afford permanent relief it is requisite, at the same time, to purge very freely. In the other phlegmasiæ[4], opium cannot with propriety be used in the early stages; but after the in-

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[1] *Nouveaux Elémens de Thérapeutique*, &c. 4th edit. tome xi. p. 76.

[2] *Medical Reports on the Use of Cold and Warm Water*, i. 290.

[3] I know of no remedy which so effectually relieves the excruciating pain of acute rheumatism, which generally makes its attack at night, as the following combination, after the application of leeches to the painful joint: ℞ Calomelanos, gr. j. Antimonii tartarizati, gr. ¼. Opii gr. jss. Fiat pilula, horâ decumbentis sumenda.

[4] Were it allowable in this work to criticise nosological arrangements, we might justly question the propriety of placing rheumatism among the phlegmasiæ.

flammatory action is subdued, it is useful in quieting cough, allaying pain, and procuring sleep. In eruptive diseases, particularly small-pox, the liberal use of opium is found to be highly beneficial, when convulsions precede the appearance of the eruption, or if the accompanying fever assume the typhoid type. It is injurious in some other of the exanthemata, especially in the diarrhœa which succeeds measles: in malignant scarlatina and in pemphigus it is equally valuable; but its use is contra-indicated in the delirium of scarlatina, and altogether in this class of diseases when the fever is inflammatory. In the hæmorrhagiæ it is useful when the discharge arises chiefly from an increased degree of irritability, and where the pulse, instead of being strong and full, is small, quick, and intermitting. Hence its efficacy in the floodings of weakened habits after abortions, and in phthisical hæmoptysis. In uterine hæmorrhages the dose should be large, not less than sixty minims of the tincture. It has been recommended also after blood-letting, in the hæmoptysis and hæmatemesis of the latter months of pregnancy.

Although opiates are hurtful at first, and check expectoration in bronchitis, yet, when the cough remains obstinate, their good effects are undoubted; and in the contagious catarrh or influenza, an opiate at bed-time is requisite for quieting the cough in every stage of the disorder. In dysentery, also, the benefit to be derived from opium depends very much on the bowels having been previously well cleared, in which case it allays the tormina and tenesmus: and maintains the advantages obtained, when its use is continued in combination with castor oil; and the same remark applies to diarrhœa. In dysentery it is most useful when combined with calomel, in which case it appears to act by retaining the mercurial in the duodenum.

The spasmodic and convulsive diseases are those in which opium is most evidently useful. In tetanus, although it does not always succeed, even when given in the largest doses, yet many cases have occurred in which the continued exhibition of large doses has overcome the spasm, and cured the disease; particularly when it has been judiciously combined with cathartics: often, however, very large quantities of the remedy have been taken without any sensible effect on the state of the habit, and without relieving the disorder; and the same is the case in hydrophobia, in which 180 grains of solid opium have been taken in the space of twelve hours, without producing any apparent effect. It has been found beneficial in chorea; but, as in tetanus, it is necessary to precede its use by strong cathartics, or at least to give it in combination with these.[1] In epilepsy not connected with organic lesions it proves useful when given in combination with musk; and it has been recommended by highly respectable authority[2] in eclampsia; but its efficacy in this complaint is rather doubtful. In spasmodic asthma it shortens the paroxysms: it abates the violence of the cough in pertussis, when given after the primary fever subsides; and it is more especially useful in pyrosis and cholera than any other medicine. Solid opium, either alone or united with camphor, is the most effectual remedy for checking obstinate vomiting, proceeding from a morbid irritability of the stomach. In colic and ileus it is given in combination with laxatives, and allays the spasm and pain; nor is it less efficacious in flatulent colic with hernia. As a remedy in lues venerea, opium is still relied on by some foreign practitioners, but the idea of its antivenereal powers has been justly exploded in this country; and it is properly regarded chiefly as an useful adjunct to mercury in this disease: "by diminishing the sensibility of the stomach and bowels, it prevents many of those inconveniences which this mineral is apt to excite in the primæ viæ, and allows it to be more easily introduced into the system."[3] In short, in all cases where the irritability is morbidly increased, and where it is of importance to lessen pain, and procure sleep, opium is undoubtedly the most valuable article of the Materia Medica.

Opium is contra-indicated in all morbid states of the body, where a strong inflammatory diathesis exists; in pulmonary affections, when the cough is dry and hard, and the expectoration difficult and scanty; and if not hurtful, its use is at least doubtful in mania, in which it generally occasions restlessness instead of procuring sleep.

Externally used, opium is almost as efficacious as when it is taken into the stomach, and produces its narcotic effects without affecting the head or producing nausea. It is applied in the form of frictions, either combined with oil, or with the camphor liniment, or in the form of tincture: and thus applied it may be used in all the diseases above enumerated. We have often seen its good effects in colic; and have also witnessed its singular efficacy in symptomatic trismus, when rubbed on the jaw, and applied to the scrobiculus cordis by means of pledgets soaked in the tincture combined with the

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1 *Observations on the Administration and Utility of Purgative Medicines*, &c. 86.

2 Denman. Bland.

3 *Pearson's Observations, &c. on Articles used in the Cure of Lues Venerea*, p. 60.

oil of turpentine. A piece of solid opium stuffed into a carious tooth relieves the pain of toothache; and introduced into the rectum, either in the solid form, or dissolved in water as an enema, it affords relief in tenesmus, in painful affections of the prostate gland, and in spasmodic strictures. A weak, watery solution of it, also, is an useful adjunct to injections in gonorrhœa, and to collyria in ophthalmia; and the vinous tincture dropped into the eye removes ecchymosis, and the suffusion which often remains in that disease after the inflammation has been subdued; and restores the tone of the diseased organ. The aqueous solution also lessens the pain of open cancer, when cloths soaked in it are laid over the sore; and it is as useful in lacerated wounds of tendinous and aponeurotic parts.

With respect to the influence of the components of opium, separately administered, and of their salts, much might be said, did the nature of this work permit me to dilate on particular subjects. The value of Morphia and its salts are fully stated in the third part. (See *Morphia* and *Morphiæ Hydrochloras.*) *Narcotina* was found by Majendie to operate as an excitant on dogs; but on the human subject it produces no excitant effects; at least none were perceived by M. Baily when it was given in doses of sixty grains; and Orfila ascertained that this is the case even when it is combined with acetic acid. It has, nevertheless, been prescribed with apparent advantage as an antiperiodic in ague. *Codeia*, according to the observations of M. Barbiere, in its uncombined state, seems to operate on the nervous plexus of the great sympathetic as an anodyne, allaying pain in morbid affections of parts connected with that plexus. It neither quickened the pulse, nor disturbed the digestive function, nor caused constipation: and in causing sleep, when given in large doses, it did not affect the head like opium. When combined with acids, it excites, and the collapse which follows closely resembles that caused by the excitement of ardent spirits. The influence of *Meconina* on the animal economy has not been examined; nor is any thing known of the influence of *Narceia*. *Meconic acid* exerts no action on the living body.

Opium is generally exhibited either in substance as a pill, or under the form of tincture, and externally in that of infusion. It is necessary to avoid combining it with substances which decompose it; and therefore solutions of bichloride of mercury, acetate of lead, sulphates of zinc, of iron, and of copper; of the carbonates of alkalies, lime-water, infusion of galls, and infusion of yellow cinchona bark, and of all astringent vegetables, are incompatible in prescriptions with opium. In combination, however, with vinegar, the vegetable acids, and oil, its narcotic power is much increased, owing to the combination of the morphia with the acids, forming more active salts than the bimeconate of the opium.[1] The result of my own experience inclines me to regard the acetate as well adapted for cases of phthisis and inflammatory affections, where it is of importance to obtain the sedative effect of the remedy free from the exciting quality.

The dose of opium should be regulated by the nature of the disease, and the peculiar intention for which it is ordered. The circumstance of the patient having been previously accustomed to its use must also regulate the extent of the dose; for in this case a dose, which to one unaccustomed to its use would prove fatal, may perhaps to another in the habit of taking it be scarcely sufficient to produce its narcotic effects. A quarter of a grain, or even less, frequently repeated, is, in general, sufficient to keep up its stimulant influence; and from gr. j. to grs. ij. act as an anodyne, and produce sleep; while in tetanus, hydrophobia, and some other diseases, f℥ v ss. of the officinal tincture have been given in twenty-six hours, without occasioning any bad effects, or even producing sleep.[2]

The use of opium for the purpose of exhilarating the spirits

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[1] The effects of vegetable acids in augmenting the efficacy of opium is displayed in the great power of that preparation of opium, which has been known, for upwards of a hundred years, under the name of "*Black Drop.*" The following is the mode of preparing it, as published by Dr. Armstrong (vide *Practical Illustrations of Typhus*), from the papers of the late Edward Walton, of Sunderland, one of the near relations of Edward Tonstall, of Bishop's Auckland, by whom it was originally prepared. "Take half a pound of opium sliced; three pints of good verjuice; one and a half ounce of nutmegs; half an ounce of saffron. Boil them to a proper thickness, then add a quarter of a pound of sugar, and two spoonsful of yeast. Set the whole in a warm place near the fire six or eight weeks, then place it in the open air until it becomes a syrup; lastly, decant, filter, and bottle it up, adding a little sugar to each bottle." One drop of this preparation is calculated to be equal to three drops of the Tincture of Opium of the London College. It evidently owes its efficacy to the *acetate of morphia:* which is formed by the verjuice decomposing the bimeconate of the opium. The acetate itself is a more elegant preparation; and produces its effects in doses of $\frac{1}{2}$ a grain. There is also some reason for thinking that another preparation of opium, the *Liquor Opii Sedativus,* of Mr. Batley, of Fore Street, London, which has been justly esteemed an excellent preparation of the drug, owes its efficacy to the acetate of morphia. The mode of preparing it is as yet kept secret; but I know that the whole of the resinous part of the opium employed is separated and rejected; and probably acetic acid is employed to separate the gummy part. Dr. Paris (*Pharmacologia*) states as an objection to this preparation, that it undergoes some important change on being kept. Justice obliges me to say, that my experience does not allow me to concur in this remark. I used the remedy before it was sold to the Profession, and I gave it the name it bears; and although I have, since, constantly prescribed it, and kept the preparation in rather a warm situation, yet I have not observed the change of which Dr. Paris has spoken.

[2] *Currie's Medical Reports,* &c. i. 138.

has long been common in Turkey, Syria, and China[1]; and of late years it has been unfortunately adopted by many, particularly females, in this country. Russell[2] says, that in Syria, when combined with spices and aromatics, he has known it taken to the amount of ʒ iij. in twenty-four hours. Its habitual use cannot be too much reprobated. It impairs the digestive organs, consequently the vigour of the whole body, and destroys also gradually the mental energies. The effects of opium on those addicted to its use, says Russell, are at first obstinate costiveness, succeeded by diarrhœa and flatulence, with loss of appetite and a sottish appearance: the memory soon fails; the individuals become prematurely old, and then sink into the grave, objects of scorn and pity.[3]

When opium has been taken in an over-dose, the first thing to be done for counteracting its bad effect, is to empty the stomach with the stomach pump, or, if that be not at hand, by the exhibition of a powerful emetic; and for this purpose ʒ ss. of sulphate of zinc, or from grs. x. to grs. xv. of sulphate of copper dissolved in water should be immediately swallowed, and the vomiting kept up for a considerable time, and urged by irritation of the fauces; but as these substances sometimes

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[1] The inhabitants of these countries regard it also as an aphrodisiac. "Ad venerem enim ciere integræ nationes norunt, et in hunc usum adhibent: sic Japonenses, Chinenses, magis Indiæ, Persæ, Ægyptii, et Turcæ aphrodisiacum opium, referentibus Pr. Alpino, Saar (*Itinerar. Ind. orient.*), Cleyer (*Eph. N. C.* 11. x. 35.) Fœminas Turcias opio viros incitare refert Jahn (*Mat. Med.* ii. 265.). Vide *Opium Hist. Chem. atque Pharm. invest. per C. A. Christen.* 8vo. p. 53. In China opium is smoked, but the custom is illegal; and so late as 1796 the punishment was pilloring and the bamboo: at present pecuniary penalties are inflicted, but nevertheless the custom prevails, and gains ground. Those who indulge in it are said rarely to live beyond fifty years of age.

[2] *History of Aleppo*, i. 128.

[3] Mustapha Shatoor, an opium eater in Smyrna, took daily three drachms of crude opium. The visible effects at the time were the sparkling of his eyes, and great exhilaration of spirits. He found the desire of increasing his dose growing upon him. He seemed twenty years older than he really was; his complexion was very sallow, his legs small, his gums eaten away, and the teeth laid bare to the sockets. He could not rise without first swallowing half a drachm of opium. (*Phil. Trans.* xix. 289.) Some years ago I was consulted by a lady who took a wine pint and a half of laudanum every week, and who, as she began to experience its bad effects on her constitution, was anxious to discontinue it, but was uncertain how to proceed. I recommended her to get a three-pint bottle of the drug, and to continue her usual dose; but, after taking each portion out of the bottle, always to replace it with water; so that in the progress of time, the bottle would contain water only, and her propensity would be cured. She continued the plan for one week only, and having left my neighbourhood, I have had no opportunity of knowing the consequence of her return to the abuse of opium. Opium appears to have no detrimental effect on white ants, who eat it freely and in large quantities.

fail in producing vomiting, the following draught has been recommended: ℞ Ammoniæ Subcarbonatis, ℈ j.; Pulv. Ipecacuanhæ, ʒ ss.; Aquæ Menthæ pip. f ℥ iij.; Tinct. Capsici, f ʒ ij.[1] This has certainly the advantage of rousing the system, at the same time that it evacuates the stomach. Large draughts of vinegar and water, or other acidulated fluids, should be frequently taken, after the stomach has been completely evacuated, and the powers of the habit must be supported by brandy, coffee, and cordials. The sufferer should be kept awake, and, if possible, in continued gentle motion. Currie recommends the effusion of warm water at 106° or 108°[2], for removing the drowsiness. The costiveness, which supervenes, when the patient recovers, should be treated with aromatic purges, and the tone of the habit restored by stimulating tonics and the shower-bath. In some idiosyncrasies even the external application of opium will produce poisoning. In a case related by M. Guiand, jun. of Marseilles, an ounce of laudanum, applied in a poultice to the limb of a soldier in the Hospital St. Louis, at Paris, affected with erysipelas, produced all the symptoms which follow from a large dose taken into the stomach, and occasioned death. The only appearance observed on the dissection were a few red injected spots in the arachnoid; but a strong odour of opium exhaled from the body.[3] When either simple morphia, or the acetate of that salt is taken in an over-dose, say two or three grains, it operates as a virulent poison. The symptons are headache, frightful reveries, vertigo, dimness of sight, subsultus, violent agitation, and obstinate vomiting. The pupil in the majority of cases is contracted. There is pain also in the epigastric region, and in the course of the intestines, but the breathing is not much affected. Pruritus of the skin is almost a constant symptom of poisoning by morphia.[4] M. J. L. Lassaigne has proposed the following method of detecting it when it has proved fatal. Digest the stomach or its contents, evaporating nearly to dryness in alcohol, and precipitate by the subacetate of lead. Filter the solution, and pass through it a stream of hydrosulphureted gas to precipitate any excess of the salt of lead; then evaporate the solution in vacuo, and add to the residue nitric acid. If morphia or its acetate be present, a yellow-orange colour, which changes to a blood-

[1] See a paper by Mr. Sprague, *Medical Repository*, vol. xviii. p. 125.
[2] *Reports on Water*, i. 80.
[3] *Observateur des Sciences Méd. Marseilles, Août*, 1825.
[4] *Lond. Med. Repos.* vol. i. *New Ser.* p. 80.

red, will be produced.[1] Another method proposed by Serullas is to evaporate a portion of the suspected fluid, then to mix it with a small portion of a neutral iodate of potassa, and some mucilage of starch: on adding a drop or two of sulphuric acid, if the mixture contain morphia, the blue colour will be instantly produced. In this case the iodic acid of the iodate is decomposed, and iodine being set at liberty strikes the blue colour. When the quantity is very small, it may be detected by precipitating the suspected fluid with acetate of lead, washing the meconate of lead thus procured, and then decomposing it by sulphuric acid. Meconic acid is thus set free, and readily detected by a solution of perchloride of iron.

Officinal preparations. — Of the Poppy Capsules: *Decoctum Papaveris*, L. D. *Extractum Papaveris*, L. E. *Syrupus Papaveris*, L. E. D.—Of Opium: *Opium purificatum*, D. *Confectio Opii*, L. D. *Elect. Opii*, E. *Elect. Catechu*, E. *Elect. Catechu comp.*, D. *Extractum Opii*, L. E. D. *Pilulæ Opii*, E. *Pilulæ Saponis cum Opio*, L. D. *Pulvis Opiatus*, E. *Pulvis Cornu usti cum Opio*, L. *Pulvis Cretæ comp. cum Opio*, L. D. *Pulvis Ipecacuanhæ comp.*, L. E. D. *Acetum Opii*, D. *Tinctura Opii*, L. E. D. *Tinctura Camphoræ composita*, L. D. *Tinctura Opii ammoniata*, E. *Trochisci Glycyrrhizæ cum Opio*, E. *Vinum Opii*, L. *Emplastrum Opii*, D. *Enema Opii*, D. *Linimentum Saponis cum Opio*, D.

PETROLEUM. Vide *Bitumen*.

PHASIANUS. *Syst. Nat. Gmelin*, i. 737.

D. 1. Vertebrata. *Cl.* 2. Aves. *Ord.* 4. Gallinaceæ. *Cuvier.*

G. 101. *Beak* short, strong. *Cheeks* made smooth, with a naked skin. *Feet* spurred.

Species 1. P. *Gallus.* The Dunghill Fowl. *Willd. Ornith.* 154. *t.* 26.

Officinal. OVUM, *Lond.* The Egg.

Syn. Œuf (*F.*), Ein, Ey (*G.*), Ouvo (*I.*), Huevo (*S.*), Ey (*Dutch*), Aeg (*Dan.*), Agg (*Swed.*), Ovo (*Port.*), Jaizo (*Russ.*), Jaie (*Poln.*), Wegce (*Bohm.*), Muna (*Finl.*), Moune (*Lapl.*), Jemurda (*Turk.*), Tochem (*Pers.*), Ménnik (*Greenl.*), Mannig (*Esquimaux*), Mootay (*Tam.*), Anda (*Sans.*), Gubbel (*Bornouse*).

The common domestic fowl is too well known to require any description. The country whence it originally came has not been correctly ascertained, although it is conjectured that it was brought from Persia by the Phœnicians, about 500 years before the birth of Christ.[2] As an article of food, it is the least stimulating of animal substances; and the broth

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[1] *Bulletin des Sciences Médicales*, t. i. p. 147.

[2] *British Zoology*, i. 280. There is a variety of the common fowl, named the *Dorking Fowl*, from being generally procured at Dorking in Surrey, which has two toes behind instead of one. Another variety is found at Mozambique, and at Siam, which has the skin, bones, periosteum, and sometimes the flesh, quite black, and yet it is esteemed good eating.

made of the young fowl or chicken is not only the best restorative diet for the convalescent, but is also a useful diluent in cholera, dysentery, and other disorders of the bowels. After they are a year old, their flesh becomes less and less digestible; but the capon and poulard retain their tenderness longer.

The egg consists of two distinct fluid matters, the white and the yolk; the membranes which enclose these; and the shell.[1]

Qualities.—The *white* of the egg is inodorous and insipid, of a glairy, viscid nature, readily dissolving in water, coagulable by a heat of 165° Fahrenheit, and also by acids and alcohol. When coagulated it becomes sapid, and is no longer soluble, either in cold or hot water. From the experiments of Dr. Bostock, it appears to be composed of water 85·0, albumen 1·2, in 100 parts; and, besides, shows traces of uncoagulable matter 2·7, and salts 0·3, sulphureted hydrogen gas, and benzoic acid. The *yolk* is also inodorous, but has a bland, oily taste; and when agitated with water forms a milky emulsion. When long boiled, it becomes a granular solid, and yields by expression a yellow, insipid, fixed oil. It consists of four constituents, water, oil, albumen, and gelatine; on the presence of the albumen depends the hardness of the boiled yolk. The *shell* consists of carbonate of lime, phosphate of lime, and animal mucus. When it is burnt, the carbonic acid is dissipated, the animal cement destroyed, and pure lime, with phosphate of lime, obtained. As long as the yolk remains suspended in the centre of the albumen, an egg is supposed to be good; but it spoils as soon as the yolk touches the shell. The preventing the admission of air through the pores of the shell preserves eggs for a longer period than they otherwise could be kept good. This is effected by covering the egg with grease, or dipping it into lime water. A fresh or good egg appears semitransparent, when placed between the eye and the light: but when it is opaque or irregularly clouded, it must be rejected.

Medical properties and uses.—The yolks of raw eggs are gently laxative, and have been thought serviceable in jaundice and other hepatic obstructions. Beaten up with sugar and wine, they are extremely nutritive, and are consequently useful in convalescences, and other cases of debility. In pharmaceutical operations, the yolks are used for rendering oil and balsams miscible with water; and the whites for clarifi-

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[1] Hens have been known to lay eggs when twenty years old. *Supplement to Latham*, 207.

cation.[1] The shells are antacid; but possess no advantages over chalk when unburned, or lime when they are burned.

PHOSPHORUS.[2]

Officinal. PHOSPHORUS, *Lond.*
Syn. Phosphore (*F.*).

This substance was discovered by Brandt, a chemist of Hamburgh, in 1669: it was prepared from putrid urine, but the process remained a secret until 1737; and in 1769 Jahn having discovered it in bones, Scheele made public the method of preparing it which is now practised. The bones are first calcined completely, to destroy their animal matter; they are then reduced to a fine powder, and digested with half their weight of strong sulphuric acid, and a small quantity to give the whole the consistence of a thin paste. The phosphate of lime, the proportion of which is about four-fifths of the calcined bones, is thus decomposed, and a sulphate and a superphosphate of lime are formed. The former is insoluble, the latter is dissolved in hot water, and the filtered solution evaporated to the consistence of syrup: it is then mixed with one-fourth of its weight of charcoal, and strongly heated in an earthen retort luted with clay, the beak of the retort being placed under water. As the heat increases, the phosphorus first comes over in the form of a reddish brown phosphuret of carbon, and afterwards the phosphorus distils, and is condensed in the water; a second distillation renders it pure. In this process the charcoal decomposes the acid of the superphosphate, carbonic acid and phosphorus pass over, and phosphate of lime and redundant charcoal remain in the retort. The fused phosphorus is run into moulds and formed into small cylinders.

Qualities.—Pure phosphorus is diaphanous, and almost colourless, but it usually has a yellowish hue: it is flexible, ductile, soft enough to be cut with a knife, and displays on the cut surface a waxy lustre. Its sp. gr. is 1·77. It fuses at 108, and is sublimed in vapour at 550°. It is stated to be insoluble in water; but when kept in that fluid it yields to it both odour and taste. It is partially soluble in alcohol and ether, and by the aid of heat dissolves in oils, both fixed and volatile. Exposed to the air at 60°, phosphorus undergoes slow combustion, and is converted into phosphoric acid, by

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1 Owing to peculiar idiosyncrasy the smallest portion of the white of egg cannot be eaten by some persons without occasioning pain, sickness, and an erythematic eruption on the skin.

2 Φωσφόρος, from φῶς, *light*, and φέρειν, *to carry*

abstracting the oxygen of the air. A very slight degree of heat, even friction between the fingers, inflames it, and it burns rapidly. The cylinders are usually kept in water, and when exposed to light acquire a white coating, which Rose[1] has ascertained to be neither an oxide nor a hydrate, but a peculiar mechanical change in the phosphorus. The equivalent of phosphorus is 15·7. (*Turner.*)

Medical properties and uses.—Phosphorus is a most powerful excitant and diuretic; and, except in small doses, operates as a poison. Its obvious effects are displayed on the generative organs, as an aphrodisiac, a fact confirmed by the experiments of Leroy and Chenevix. It has been employed on the Continent in low, sinking conditions of the habit, the result of various diseases, and in impotency. As ether diminishes the inflammability of phosphorus, the etherial solution, made with gr. iij. of phosphorus and f℥j. of ether[2], has been chiefly employed in doses of ten drops, in any bland vehicle, repeated every second, third, or fourth hour, according to circumstances. M. Lescot and others prefer oil as a vehicle. M. Lescot digests ʒj. of phosphorus cut in small pieces in ℥j ss. of olive oil, and after allowing the compound to stand in a dark place for fifteen days, he decants, and flavours the solution with oil of bergamot. The dose of this oil is ♏xx to ♏xxx in any bland mucilage. Under every circumstance, the utmost caution is requisite during the internal administration of phosphorus.

Officinal preparation.—*Acidum Phosphoricum dilutum,* L.

PHYSETER. *Syst. Nat. Gmelin,* i. 227.

D. 1. Vertebrata. *Cl.* 1. Mammalia. *Ord.* 8. Cetacea. *Cuvier.*

G. 39. *Teeth* in the lower jaw, but none in the upper. *Tube* in the head, or great front.

Species 2. P. *Macrocephalus.* Spermaceti Whale. *Willough. Pisc. t.* A. 1. *f.* 3. *Phil. Trans.* lx. 321. *t.* 9.

Officinal. CETACEUM, *Lond. Dub.* SPERMACETI, *Edin.* Spermaceti.

Syn. Spermaceti; Cétine (*F.*), Wallrath (*G.*), Walschot (*Dutch*), Walraf (*Swed.*), Spermaceti (*I.*), Espermaceti (*S.*).

This species of whale inhabits chiefly the Southern Ocean, although it is occasionally seen in the European seas. It is a large fish, generally measuring about sixty feet in length, and thirty in circumference at the thickest part of the head, which is blunt, and about nine feet in height. It is of a blackish colour on the upper part of the body, and white on

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[1] *Pog. Annalen,* xxvii. p. 565.

[2] *Ether phosphoratus* of the Paris Codex.

the belly. There are forty-six double teeth in the lower jaw, which is shorter than the upper; and in the head is a triangular, bony cavity, covered by the common integuments only, and filled with an oily fluid, which, on the death of the fish, congeals into a spongy mass. The eyes are small: the pectoral fins near the angles of the mouth; and the tail forked.

The spongy oily mass is dug out from the cavity of the head, and the oil separated from it by dripping.[1] In this state it has a yellow unctuous appearance, and is brought to England in barrels. The following is the mode of purifying it in the great way. The mass is put into hair bags, and pressed between two plates of iron, in a screw-press, until it becomes hard and brittle. It is then broken in pieces and thrown into boiling water, where it melts, and the impurities, rising to the surface, are skimmed off. After being cooled and separated from the water, it is put into fresh water in a large boiler, and a weak ley of the potassa of commerce added to it by degrees. This part of the process is thrice repeated, after which the whole is poured into coolers, where the spermaceti concretes into a white semi-transparent mass, which, on being cut into small pieces, assumes the flaky aspect it has in the shops.[2]

Qualities.—Purified spermaceti is a white, crystallized, friable, semi-transparent, unctuous substance, nearly inodorous and insipid. Its specific gravity is 9·433. It melts below 212° Fahrenheit[3]; and at a higher temperature, 500°, it evaporates, very little altered; although by repeated distillations it is partly decomposed, and a brown acid liquor obtained. Like the fixed oils, it leaves, when heated on paper, a greasy stain, and can be diffused in water by means of the yolk of egg or mucilage. It is soluble in 13 times its weight of boiling alcohol, still more soluble in ether and oil of turpentine, but it concretes again as the fluids cool: it is completely soluble in the fixed oils. When boiled with alcohol, it becomes fusible at 49°, more brilliant and less unctuous, less odorous, and more soluble in alcohol: the white crystalline scales deposited as the solution cools have been called *Cetine.*[4] Of the acids, the sulphuric only acts on it, dissolving it, and forming a dark-coloured, thick, soapy solution, which has a faint smell of sulphur. The alkaline carbonates do not affect it, but it is partially dissolved in the pure alkalies; and with

[1] An ordinary sized whale will yield upwards of twelve large barrels of crude spermaceti.

[2] *Monthly Magazine*, August, 1809.

[3] Bostock, *Nichol. Journ.* iv. 134.

[4] Chevreuil, *Ann. de Chim. et de Phys.* tom. vii. p. 157.

hot ammonia it forms a soapy emulsion which is not decomposed by cooling. Long exposure to hot air renders it rancid; but it may be again purified by being washed in a warm ley of potassa.

Medical properties and uses.—Spermaceti is demulcent and emollient. It, however, possesses no advantages for internal use over the fixed bland oils. It is used in dysentery and irritations of the alimentary canal, and in catarrh and phthisis: but in the latter cases it is less beneficial than the bland oils; for, as these are readily united with water by means of alkalies and mucilages, the compounds formed with them are more viscid, and better adapted for smearing the fauces. Several imaginary healing virtues were, formerly, supposed to belong to spermaceti; on which account it was and still is often given to women in child-bed. It is, however, when combined with water by means of the yoke of egg, a pleasant vehicle for tincture of opium, when the after-pains are troublesome. It forms a part in the composition of several ointments.

The dose is from ʒss. to ʒjss. rubbed with sugar, or in the form of emulsion.

Officinal preparations.—*Ceratum Simplex*, E. *Ceratum Cetacei*, L. *Unguentum Cetacei*, L. D. *Ceratum Cantharidis*, L.

PIMPINELLA. *Spec. Plant. Willd.* i. 1471.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 562. *Fruit* ovate-oblong. *Petals* inflected. *Stigma* nearly globular.

Species 8. Pimpinella *Anisum.*[1] Anise. *Med. Bot. 3d edit.* 135. *t.* 52.

Officinal. ANISI SEMINA, *Lond.* PIMPINELLÆ ANISI SEMINA, *Edin.* ANISUM, *Dub.* Anise-seeds.

Syn. Graines d'Anis (*F.*), Anis (*G. Dan.*, *Swed.*, *Russ.*), Anice (*I.*), Herbadoce (*Portug.*), Anis; Matalahuga (*S.*), Anys (*Dutch*), Anyz (*Poln.*, *Bohm.*), Anison (*Arab.*), Souf (*H.*), Seri nisii (*Japan.*), Rosianeh roomi (*Pers.*), Adis manis (*Javanese*), Somboo (*Tam.*), Jera manis (*Malay*).

This is an annual plant, a native of Egypt; but it is cultivated abundantly in Malta and Spain, and in our physical herb gardens[2]; flowering in July. It is a delicate plant, and rises about a foot only in height. The stem is striated, smooth, jointed, and branching: the lower leaves are roundish, lobed, and toothed; but the upper ones are divided into narrow, pinnated segments: the flowers are small and white,

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[1] Ἄννησον Dioscoridis, who says—"lactis ubertatem præstat, venerem stimulat." l. 3. c. 65.

[2] A considerable quantity is cultivated at Mitcham in Surrey, chiefly for the use of the rectifiers of British spirits. *Stevenson's Survey*, 279.

in flat, terminal umbels, without involucres; the seeds are oblong, swelling, striated, and of a greenish colour.

The anise grown in this country ripens its seed sufficiently to be gathered about the middle of August. A greater quantity of seed, however than is grown here is annually imported from Malta and Spain. The Spanish is small, and generally preferred. The heaviest are to be preferred.

Qualities.—Anise-seeds have an aromatic odour, which is increased when they are rubbed in the hands, and a sweetish, warm, grateful taste. Both alcohol and water extract their virtues; and in distillation with water they yield a yellowish volatile oil, which concretes at a temperature of 50° of Fahrenheit. An oil of a greenish colour also is obtained from anise-seeds by expression; it consists of a bland, fixed, inodorous oil, mixed with a large portion of the proper essential oil. The constituents of this oil are 76·487 carbon + 13·821 oxygen + 9·352 hydrogen + 0·340 nitrogen = 100·000.

Medical properties and uses. These seeds are carminative; and are supposed to possess the power of promoting the secretion of milk. They are chiefly used in flatulencies, and in the tormina of infants. They are given in substance bruised, in doses of from grs. x. to ʒ ij.

Officinal preparations.—*Oleum Anisi*, L. E. D. *Spiritus Anisi*, L.

PIMEN'TÆ BAC'CÆ. Vide *Myrtus*.

PINUS. *Spec. Plant. Willd.* iv. 494.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Coniferæ.

G. 1711. *Male. Calyx* four-leaved. *Corolla* none. *Stamens* many. *Anthers* naked.

——— *Female. Calyx* strobiles, with a two-flowered scale. *Corolla* none. *Pistil* one. *Nut* with a membranous wing.

* *With double leaves.*

Species 1. P. *sylvestris.* The Wild Pine, or Scotch Fir. *Med. Bot. 2d edit.* 1. *t.* 1. *Smith, Flora Brit.* 1031. *Lambert, Description of the genus Pinus,* i. *t.* 1. *Michaux, North American Sylva,* vol. iii. pl. 138.

* * * * *With fascicled leaves.*

Species 24. P. *Larix.* The Larch. *Med. Bot. 3d edit.* 7. *t.* 4. *Lambert,* 53. *t.* 35.

* * * * * *With solitary leaves, distinct at the base.*

Species 27. P. *Balsamea.* Balm-of-Gilead Fir. *Lambert,* 48. *t.* 31. *Pursh,* ii. p. 639. Abies *balsamifera. Michaux,* iii. pl. 150.

Species 32. P. *Abies.* Norway Spruce Fir. *Med. Bot. 3d edit.* 4. *t.* 2. *Lambert,* 37. *t.* 25. Abies *picea. Michaux, North American Sylva,* pl. 146.

1. PINUS SYLVESTRIS.

Officinal. α. TEREBINTHINA VULGARIS, *Lond. Edin. Dub.*

β. TEREBIN'THINÆ OLEUM, *Lond.* PINI OLEUM VOLATILE, *Edin. Dub.*

γ. RESINA, *Lond.* RESINI PINI, *Edin.* RESINA, *Dub.* PIX NIGRA, *Lond.*

δ. PIX LIQU'IDA, *Lond. Dub.* RESINA EMPYREUMATICA, VULGO, PIX LIQUIDA, *Edin.*

Common Turpentine. Oil of Turpentine. Resin. Black Pitch. Tar.

Syn. α. Térébinthe (*F.*), Gemeiner Terebenthiu (*G.*), Trementina (*I.* & *S.*), Cota (*Nepaulese*), Ratingeroo mie (*Arab.*), Zungbarie (*Pers.*). β. Huile essentiale de Térébinthe (*F.*), Terbenthinöhl (*G.*), Olio della Trementina (*I.*), Azeyte de Trementina (*S.*) γ. Resine blanche et flave (*F.*), Fichtenharz (*G.*), Ragia di pino (*I.*), Resina de pino (*S.*). δ. Goudron (*F.*), Theer (*G.*), Pece liquida (*I.*), Brea (*S.*).

The Wild Pine, or Scotch fir, so named from its growing wild on the Scotch mountains, is common in most of the northern parts of Europe.[1] It is a straight, abruptly-branched tree, rising in a favourable soil, to the height of more than eighty feet, and four or five in diameter, covered with a rough, cracked, brownish-coloured bark, and always clothed with foliage. The leaves are short, linear, entire, pointed, concave on one side, and convex on the other, about two inches long, twisted, of a bright green colour, and issuing in pairs from a white truncated sheath; the flowers are white, or rather of a yellowish tint: the *male catkin* is densely spiked, bracteated, elliptical, obtuse, with numerous scales crested on the upper side, but on the under bearing a sessile anther: the *female* is inferior, often ternate, or three together round the branches, peduncled, smooth, of a green colour, and changes into a small, nearly pointed, conical, greyish strobile or cone, which appears tessellated and warty, and bears within each scale two small black-winged seeds.

This tree is at its perfection when between seventy and eighty years old; but it yields turpentine at the age of forty.[2] Those trees which are most exposed to the sun, and have the thickest bark, afford it in the greatest abundance. The operations for procuring it commence in the month of May: the outer bark is stripped off for six inches, so as to expose the inner smooth bark, near the foot of the tree, and a wound made with a sharp tool three inches square, and an inch deep. The resinous juice soon begins to exude in transparent drops,

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[1] When Cæsar asserted that the fir did not grow in Britain, he must have meant the *P.* Abies. The ancient name of the fir in Scotland was *Gius*, in Ireland *Giumhus*, and in Wales *Fynniduydh*. The following, also, are synonima of this tree. *Die Kiefer* (G.), *Pynboom* (Dutch), *Furr* (Dan.), *Tall* (Swed.), *le Pin* (F.), *il Pino* (I.), *el Pino* (S.), O. *Pinheiro* (Port.), *Sosna* (Russ.), *Mandy* (Finl.), *Betze* (Lapl.), *Maats* (Japan.) *Sum* (Chinese), *Bor* (Sclav.). It prefers an arid, siliceous soil.

[2] Great ravages are committed on this tree by Bostrichus *piniperda*, an insect which, by introducing itself into the cellular integument, separates the bark from the wood, and thus destroys the life of the plant.

which fall into a hole previously dug at the foot of the tree: fresh incisions are successively made till September, when the cold checks the further exudation. The warmer the weather is, the greater quantity of turpentine is obtained; and a healthy tree may thus yield from six to twelve pounds of turpentine annually, for a century of years. The turpentine which flows into the holes dug at the bottom of the tree is called *pure dipping*. Part of the juice concretes in the wounds, and is called *galipot* in Provence, and *barras* in Guienne; but although it contains oil, yet it is not used for the purpose of procuring it. The proper turpentine is purified by being exposed to liquefy in the sun's rays, in barrels perforated in the bottom, through which it filters.[1]

The *oil of turpentine* is obtained by distilling the pure turpentine and galipot with water in a common still, when the oil is found in the receiver swimming on the water, from which it is easily separated: the average proportion is 60 lbs. of oil from 250 lbs. of good turpentine. When rectified it is called *spirit* or *essential oil.* This process of procuring oil of turpentine is carried on both abroad and at home; but the oil drawn in this country is always preferred.

Common resin, or *yellow resin,* is the residue of the distillation of turpentine. It receives different appellations according to the mode in which the process is carried on. When the distillation is performed without addition, and continued to dryness, the residue is called *common resin* or *colophony*[2]; but when agitated with about one eighth of fresh water while yet fluid, it is named *yellow resin.* A similar resin is made by melting and agitating the *galipot* in water; and this is preferred in general to the former kind, on account of its greater ductility, which arises from its containing a portion of oil.

Tar[3] is the last officinal preparation from this species of fir which we have to notice. The greater part of the tar imported into Britain is brought from the Baltic, *i. e.* Russia, Sweden, and Denmark; but a considerable quantity comes from the United States, where it is chiefly obtained from the Pinus *australis,* long-leaved pine of Michaux, and is still prepared in nearly the same method as described by Theophrastus and Dioscorides to have been practised by the ancients.

The pine or fir trees intended to yield tar are decorticated

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1 The quantity of turpentine annually imported into Britain is about 12,000 tons. That brought from Bordeaux is prepared from the Pinus *maritima;* that from North America from the Pinus *australis.*

2 The colophonia of the ancients was a liquid resin, named from Κολοφων, a town of Ionia, in Asia Minor, whence it was brought.

3 Κωνον Græcorum.

and left for a year, after which they are felled, and the roots and the branches of the trees cut into billets, split, and piled in a kiln, and covered with turf; or they are placed in a conical cavity dug in the ground, and piled up in large stacks, which are covered with turf, with spaces left for air to pass, to keep up combustion. Fire is then applied to the top of the pile, and it is suffered to burn downwards with a slow smothered flame, which continues, for ten or twelve days: during this time the tar is formed by the decomposition of the resinous juice; it flows to the bottom, and runs out, through a small channel cut for the purpose, into barrels. The stacks are generally built on the slope of a hill, so that the tar can be easily collected, and put into barrels; in which state it is brought to this country.

Pitch is condensed tar, procured by evaporation—five barrels of tar yield two barrels of pitch.

Both are compounds of resin, empyreumatic oil, pyroligneous acid, and charcoal.

2. PINUS LARIX.[1]

Officinal. α. RESINA LIQUIDA, *vulgo.* TEREBINTHINA VENETA, *Edin.* RESINA LIQUIDA, *Dub.*
β. PINI OLEUM VOLATILE, *Edin.* Venice Turpentine; Oil of Turpentine.

Syn. Térébinthe de Vénise (*F.*), Venetischer Terbenthin (*G.*), Trementina Veneta (*I.*).

There are two varieties of the larch tree, one of them a native of America, the other of the South of Europe and Siberia. It rises erect to the height of fifty feet in northern climates, but in the South it rises upwards of 100 feet, sending off slender, spreading branches, which droop at their extremities. The leaves are deciduous, soft, and of a bright-green colour; in tufts, generally containing forty or more, springing from short, thick, corrugated sheaths, and spreading like a painter's brush; linear, somewhat obtuse, and entire: the male flowers, which appear in April, are in small, lateral, cylindrical catkins, with the apexes of the anthers inflated; the female are in erect, ovate catkins, twice as large as the male, and in some instances purple at the top: the strobiles or cones are about an inch long, obtuse, and purplish at the apex, with the scales smooth on the surface, lacerated at the edges, and concealing under each two winged seeds.

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[1] Πίτυς Theophrasti. *Lärchenbaum* (G.), *Lorkenboom* (Dutch), *Lerketræ* (Dan.), *Meleze* (F.), *Larice* (I. S.) *Larico* (Port.), *Listweniza* (Russ.). The larch tree has been cultivated in England since 1629.—*Hort. Kew.*

The larch tree grows to very great perfection in the forests of Baye in Provence, where a very large proportion of the Venice turpentine of commerce is procured. It is obtained by boring a hole with an auger into the heart of the tree, at about two feet from the ground, and fitting into it a small pipe, through which the turpentine flows slowly into vessels placed for its reception. This process is begun in May, and continued till September; when the different quantities collected are put together, and purified by straining through cloths or hair sieves. No trees under twelve inches in diameter are tapped; but vigorous trees will yield, annually, seven or eight pounds for forty or fifty successive years, or during the term of their life.[1] Much of the Venice turpentine of the shops is brought from America, and is perhaps procured from a different species of fir.

The *volatile oil* is separated from it by distillation in the same manner as from the common turpentine.

3. PINUS BALSAMEA.[2]

Officinal. TEREBINTHINA CANADENSIS, *Lond.* RESINA LIQUIDA, *Dub.* Canada Turpentine. Canada Balsam.

Syn. Baume de Canada (*F.*), Kanadischer balsam (*G.*).

This tree is a native of the coldest regions in North America, flowering in May. It is a straight, elegant tree, rarely exceeding 40 feet in height, and 12 or 15 inches in diameter, covered with a smooth whitish-grey bark. The leaves are in double rows, like a comb, short, not exceeding 8 lines in length, and linear, but broader than the former two species, and less pointed, of a bright green colour on the upper surface, marked with whitish lines underneath, and fragrant: the cones, which ripen in October, stand erect on the branches, are large, nearly cylindrical, of a beautiful, deep, glossy, purple colour, inclining to black; and exude a great quantity of transparent resin, which gives them a very rich, beautiful appearance.

The manner in which the Canada balsam, or fine turpentine, yielded by this tree, is collected, is by incisions into the body of the tree from which it exudes, and breaking the

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[1] Besides turpentine, the larch tree exudes a species of manna, which is named Briançon manna. It is in little white concrete drops, which adhere to the leaves, and tastes sweet like new honey; but it has the flavour of turpentine, which it contains. The inner part of the tree yields also a gum similar in its properties to acacia gum, of a reddish colour, with a slight resinous taste, and is perfectly soluble in water. In Russia it is officinal, and sold, as Pallas observes, under the improper name of Orenberg gum, being obtained from the Uralian Forest.—*Flora Rossica*, i. pp. 2, 3.

[2] *Balsamtanne* (G.), *Le beaumier de Gilead* (F.).

vesicles which form spontaneously on the tree. These vesicles exist in great quantity between the wood and the bark. Canada balsam is brought to this country in casks, each containing about one hundred weight.

4. PINUS ABIES.[1]

Officinal. α. ABIETIS RESINA, *Lond.* Resin of the Spruce Fir.
β. PIX ABIETINA, *Lond.* RESINA SPONTE CONCRETA, *vulgo.* PIX BURGUNDICA, *Edin.* RESINA. THUS. PIX BURGUNDICA, *Dub.* Burgundy Pitch.

The Norway spruce fir is a native of Europe, and of the moist parts of Northern Asia, flowering in April. It is a lofty, noble tree, rising from 150 to 200 feet in height, and from three to five feet in diameter; it is straight, pyramidal, and covered with a reddish scaly bark. The leaves are short, thickly set upon the branches, slightly carinated on both sides, of a dusky green colour, shining on the upper surface, and often curved: the male catkins are ovate, purplish, and scattered in the axils of the leaves; the female are also purple, and generally terminal; the strobiles or cones are long, nearly cylindrical, greenish before they are ripe, but afterwards purple, and always pendent; the scales, which are arranged in eight spiral rows, have an oval shape terminating in a point, and become ragged at the edges.[2]

The *Resin* or *Thus* of the old London Pharmacopœia exudes spontaneously from the bark of the Norway spruce fir, and concretes as it exudes. It undergoes no preparation, but is brought to us in the form of tears or small masses, packed in casks, each containing from one to two hundred weight. The greater part comes from Germany; but a small quantity of a purer description comes from France.

Burgundy pitch is obtained by making incisions through the bark, so as to lay bare the wood. It concretes in the form of flakes at the incisions, which are detached by an iron instrument, once a fortnight during the summer, and fresh incisions successively made. The flakes after being detached, are put into large boilers with a sufficient quantity of water, melted, and then strained through coarse cloths under a press. The greatest quantity is collected in the neighbourhood of Neufchatel, whence it is brought to this country, packed in

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[1] Ἐλάτη Theophrasti. *Die Fichte* (G.), *Hartsboom* (Dutch), *Gran* (Dan., Swed.), *La Pesse* (F.), *Picea* (I., S.), *Peuce* (Port.), *Jel* (Russ.). This species of fir is cultivated in Britain, but it does not appear to have been introduced before 1739. When grown in Norway it is used for masts; but that which is cultivated in Britain is used only for the coarsest purposes.

[2] Like the Scotch fir, it is attacked by the Bostrichus *piniperda.*

casks. A fictitious sort is made in England, and found in the shops under the title of *common* Burgundy pitch. It may be distinguished by its friability, want of viscidity, and unctuosity, and the odour which characterises the genuine sort.

Qualities.—TURPENTINES.—Although these are produced from different species of the Pine tribe, and one sort from the Pistacia *terebinthus*, yet all of them possess the same general physical and chymical properties. They have a peculiar, somewhat aromatic odour, and a warm, pungent, bitterish taste; are semifluid, tenacious, translucent, combine readily with fixed oils, and are inflammable, burning with a white flame and much smoke. Alcohol and ether dissolve them entirely, leaving the impurities; but water takes up only their flavour. When distilled with water a volatile oil comes over, and towards the end of the operation succinic acid rises[1]; resin remains in the retort: the turpentines therefore are compounds of these three substances. But each sort of turpentine has characteristic qualities which require to be noticed. 1. *Common Turpentine* has a strong, somewhat fragrant odour, and a bitter, disagreeable taste; its consistence is greater than that of honey; its colour is dirty yellow, and it is more opaque than the other sorts. 2. *Venice Turpentine* is more fluid, having the consistence of new honey, a yellowish colour, and is less unpleasant to the smell and taste than the common. 3. *Canadian Balsam* (or more correctly *Turpentine*) has a strong, not disagreeable, odour, and a bitterish taste; is transparent, whitish, and has the consistence of copaiva balsam. 4. *Chian* or *Cyprus Turpentine* (see *Pistacia*) is very fragrant, but almost insipid, nearly transparent, thick, tenacious, and of a whitish colour.

Oil of turpentine has a strong, penetrating, peculiar odour, and a hot, pungent, bitterish taste. It is perfectly limpid and colourless: extremely light, volatile, and inflammable; its boiling point is 312° Fahr.: it dissolves completely in six parts of sulphuric ether; but although hot alcohol readily dissolves it, yet it again separates in drops as the spirit cools, and is very sparingly soluble in the cold in the strongest alcohol: one hundred parts in volume, however, unite with twenty of alcohol, and form a homogeneous solution, which does not become turbid by water.[2] In all other respects it agrees with the other volatile oils. It consists of 10 equiv. of carbon $=$ $61{\cdot}2 + 8$ of hydrogen $= 8$, making the equivalent $69{\cdot}2$. In this

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[1] *Annales de Chim.* xxi. 328. [2] Ure, *Phil. Trans.* 1822.

state it is named *Camphene.* When a stream of chlorine is passed through, an artificial camphor is formed: and I found that an imperfect camphor is also formed when a stream of oxygen gas is passed through the pure oil of turpentine.

Tar has a strong odour, familiar to every person; a resinous, subacid, bitterish taste; and a coarse, thick consistence, with a deep brown colour, approaching to blackness, derived from the charring of the wood during its formation. It consists principally of empyreumatic oil, resin, and acetic acid; is partially soluble in water; and is inspissated by boiling into pitch.

Yellow and *white resin* are varieties of the same substance. They are nearly inodorous when cold; but, when heated, emit a slight terebinthinate odour. Their taste is slightly acrid and bitterish; and their colour a dull whitish yellow, or a greenish yellow. The mass of resin is semipellucid, brittle, breaks with a true vitreous fracture, and adheres moderately to the fingers. Its specific gravity is 1·0742. It melts when heated, then inflames, and burns with a yellow flame, giving out much smoke. It is insoluble in water, but entirely soluble in alcohol, ether, the fixed oils, and the alkalies. The mineral and the acetic acids also dissolve resin, and the nitric converts it into artificial tannin. When sulphuric acid is employed, charcoal, in the proportion of forty-three per cent. of the resin acted on, is produced.[1] The *resin of the Norway Spruce* possesses nearly the same properties. It is in the form of solid brittle tears, of a brownish yellow colour on the outside, and internally white; and emits a very agreeable odour when burning.

Burgundy pitch has a terebinthinate odour and taste, is brittle, opaque, and of a light yellow or reddish brown colour. It softens moderately in the heat of the hand, appears unctuous, and has a considerable degree of tenacity.

Medical properties and uses.—The *Turpentines* and their *essential oil* are stimulant, cathartic, diuretic, anthelmintic, and externally rubefacient. Of those which I have described the Venice and Canada turpentines are more generally employed for internal purposes; the common turpentine proving offensive to most stomachs, and the Chian not being easily procured. The ancients were well acquainted with the medicinal properties of turpentines[2]; and, besides the diseases for which they are prescribed by the moderns, gave them liberally

[1] Hatchett, *Phil. Trans.* 1806.

[2] See *Dioscor.* lib. i. cap. 91: p. 50. *Aretæus, passim. Ægineta de Re Med.* lib. iv. &c.

in coughs and all pulmonary affections. Turpentines seem to derive their virtues from the volatile oil which they contain. When swallowed, they produce a sensation of warmth in the stomach, at first increasing the quickness and force of the pulse, but afterwards diminishing it; and if the dose be large, some degree of nausea is excited, with slight vertigo, and soon, but not always, a copious discharge from the bowels; but if the dose be small, they act chiefly upon the kidneys. The cathartic operation of large doses of the oil, in particular, seems to counteract the determination to the kidneys, which smaller doses produce; for in doses of even f ʒ x. and f ʒ xij., no other effect on the urinary organs is perceived than the violet smell of the urine.[1] The odour of violets is produced by the oil, even when it is neither taken into the stomach, nor rubbed upon the skin; for if a quantity of oil of turpentine be poured on a table in a room, this odour will be perceived in the urine of any one who remains in the room for half an hour, or even a shorter time. When breathed, it is perceptible in the urine in fifteen minutes; and when rubbed on the skin, in twenty-five minutes.[2] Turpentines are chiefly prescribed in gleet, leucorrhœa, mucous obstructions of the urinary passages, and calculous affections; but in the latter cases their stimulant operation on the kidneys requires that they be given with caution. The oil is justly regarded as a useful remedy in lumbago, sciatica, and some other varieties of chronic rheumatism and neuralgia, particularly when combined with the cinchona bark. Dr. Copland, in a valuable paper on terebinthinous remedies[3], recommends the oil strongly in the hæmorrhagiæ, particularly in atonic epistaxis and hæmoptysis. He also confirms Dr. Percival's statement of its efficacy in epilepsy; and extols its powers in infantile convulsions, arising from a disordered state of the alimentary canal, and from erysipelas. It exerts a powerful influence on the uterine organs; and thence is useful in chlorosis. Dr. Copland states some cases of ovarian dropsy, in which the effects of the oil were such as to recommend its employment in incipient cases of this disease; and also in other dropsies, not even excepting hydrocephalus: but our experience has not confirmed these opinions. Dr. Cheyne says, in melæna, a disease which depends upon an excited state of the capillaries I have given oil of turpentine with complete success. From its action in the abdominal viscera, it has proved useful in symptomatic epilepsy.

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[1] *Transactions of the London Medical Society*, i. part i. 212, 227.
[2] *Journal Complémentaire, Oct.* 1826.
[3] *Med. and Phys. Journ.* vol. xlvi. pp. 185. 206.

For the expulsion of the tape-worm the power of the oil of turpentine is now generally known. It differs in its action from the other remedies which have been employed against tape-worm, by killing the worm before its expulsion; and thence it is more permanently useful.[1] Neither wine nor spirits should be drunk during the use of the oil; the usual quantity of food should be diminished; and the use of the oil should be immediately discontinued, if an eruption resembling eczema appear on the skin, which is apt to arise from its employment in some habits. As local stimulants, turpentines and the oil of turpentine have been efficaciously exhibited in the form of enema, in cases of colic, obstinate costiveness, and ascarides. The oil is useful when dropped into the ear in deafness from defect of wax; and is an excellent addition to embrocations in acute rheumatism, bruises and paralysis of the extremities. As a discutient, it is applied to indolent tumours, and is a useful primary application to burns.

Turpentines are given in doses of grs. x. to ʒ j., either made into pills with powdered liquorice root, or diffused in water by means of almonds, mucilage, or yoke of egg and sugar. The dose of the oil may be ♏x. to ʒj, to produce its diuretic effect: but in doses of fʒj. to fʒ ij., its effects are more general on the system. In these doses, it may be combined with aromatics and spices, and rubbed up with mucilage or honey. Dr. Copland recommends the addition of the tincture of capsicum, for correcting the nauseating and unpleasant effects which the oil frequently produces on the stomach. For the expulsion of tænia, it is necessary to give from f℥ss. to f℥ij. of the oil, repeated every eight hours till the worm be ejected: and in these large doses it is more easily taken when exhibited uncombined, or when merely floated upon water with the addition of a drop or two of any aromatic oil. If it do not operate by stool in four or five hours after it has been taken, a dose of castor oil should be exhibited.

Tar is stimulant, diuretic, and sudorific; and externally detergent. In the solid state, made into pills, it has been beneficially used in ichthyosis; but it is more generally employed in the form of tar water, *aqua picis liquidæ*. As an external application, it has been found beneficial in Porrigo scutulata, foul ulcers, and some other cutaneous diseases.

The *resins* and *Burgundy pitch* are adapted for external use

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[1] In all the cases of the expulsion of tænia by oil of turpentine, the ejected worm has generally had a livid hue, without any appearance of animation.

only; the former entering into the composition of some ointments and plasters; the latter being used as a rubefacient plaster. The pitch excites some degree of inflammation, sometimes a pimply eruption, and a purulent exudation, from the part over which it is applied, without raising the cuticle. It is used in cases of catarrh, pertussis, dyspnœa, and chronic rheumatism; and seems to be chiefly serviceable from the length of time it adheres to the skin, and by which its action can be continued.

Officinal preparations.—Of Turpentine: *Oleum Terebinthinæ purificatum*, L. D. *Oleum Terebinthinæ rectificatum*, D.—Of the Oil: *Linimentum Terebinthinæ*, L. D.—Of Yellow Resin: *Emplast. Resinæ*, L. E. D. *Ceratum Resinæ*, L. E.—Of Burgundy Pitch: *Emplast. Picis*, L. E.—Of Tar: *Aqua Picis liquidæ*, D. *Unguentum Picis liquidæ*, L. D.

PIPER. *Spec. Plant. Willd.* i. 159.
Cl. 2. *Ord.* 3. Diandria Trigynia. *Nat. ord.* Piperaceæ.
G. 74. *Calyx* none. *Corolla* none. *Berry* one-seeded.
Sp. 1. P. *nigrum*. Black Pepper. *Med. Bot. 3d edit.* 721. *t.* 246.
Molago-Codi. *Rheede, Hort. Malabar.* vii. 23. *t.* 12. *Marsden*, p. 105.
Sp. 3. P. *Cubeba*. Cubebs. *Sketches Civil and Military of Java.*
Sp. 12. P. *longum*. Long Pepper. *Med. Bot. 3d edit.* 724. *t.* 247.
Cattu-tirpali. *Rheede, Hort. Malabar.* vii. 27. *t.* 14.

1. PIPER NIGRUM.[1]

Officinal. PIPER NIGRUM, *Lond.* PIPERIS NIGRI FRUCTUS, *Edin.* PIPER NIGRUM; SEMINA, *Dub.* Black Pepper.

Syn. Le Poivrier commun (*F.*), Gemeine pfeffer (*G.*), Gemeene peper (*Dutch*), Swarteller Stark peppar (*Swed.*), Pepe nero (*I.*), Pimienta (*S.*), Mame (*Japan.*), Molago-Codi (*Malabar*), Fulful-filfil (*Arab.*), Mirch (*H.*), Maricha (*San.*), Mellaghoo (*Tam.*), Gummeris (*Cyng.*), Lada (*Malay*), Măricha (*Jav.*).

This species of pepper is a native of the East Indies; and is very abundantly cultivated at Malacca, Java, and Sumatra, whence the greater part of Europe is supplied. The French introduced the culture of the pepper into Cayenne in the 18th century, and succeeded. This Piper is a climbing, or rather radicating, plant, the stem being round, smooth, jointed, and swelling towards each joint, woody, slender, branched, and from eight to twelve feet in length. The leaves are petiolate at the joints of the branches, cordate, entire, pointed, seven-nerved, and of a dark green colour. The flowers are diœcious, sessile, whitish, or glaucous, small, each supported by a scale: they cover, thickly, a cylindrical spadix, without any regular calyx or corolla. The filaments are two or more, flat, awl-shaped; and the anthers roundish. The germen is ovate, and crowned with a deeply divided stigma: the fruit

[1] Πεπερι Dioscoridis.

is, strictly speaking, a nut, resembling a globular berry: it is at first green, changing as it ripens to a bright red colour.

In Sumatra, the pepper vines are propagated by cuttings or suckers. The natives choose for their pepper gardens a level piece of ground, moderately elevated, covered with young wood, which they burn down. These gardens are generally near the banks of rivers. In growing, the pepper vines are supported by props, called *Chinkareens*, which are plants of Morinda *citrifolia*, or of an Erythrina, at the root of each of which two vines are planted, and into the bark of which the vines send radicular claws, by which the shoots are supported; but whether any nutriment is taken up by these from the living props is uncertain.[1] At Borneo, poles instead of chinkareens are used; but Marsden says the latter are preferred, both because they last as long as the pepper vines, and their top branches, which are not lopped off, shade the vines. An argillaceous soil is the best. The plants are three years old before they bear fruit, and they bear for eight years. After the seventh year, when the plant is considered in its prime, it continues in full bearing for three or four years, and then declines. "Fruit," says Marsden, "has been gathered from some at the age of twenty years, but such instances are uncommon." The berries are four or five months in coming to maturity; are gathered as soon as any of them redden; but the best pepper is gathered green, if it be of full size. It is then spread upon mats to dry, and trodden to separate the fruit from the stalk; when they become black, and more or less shrivelled. In good seasons each vine yields about fifty pounds of pepper. The vines yield two crops yearly; the first in September, the second in March. White pepper is the ripe and perfect berries, freed of their outer coat by means of a preparation of lime and mustard oil, called *chinam*, applied before it is dried. The pepper is now also cultivated to a considerable extent in India. If the pepper be not of a proper age when gathered, it shrivels greatly, and, on removal from place to place, falls into dust. Advantage is taken of this fact to ascertain the proper time of gathering the fruit; for if the pepper have been gathered too soon, it may be almost reduced to dust by rubbing it between the hands, but, if it be of mature age, and sound, no effect is pro-

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[1] Dr. Roxburgh began the cultivation of black pepper in the Circars in 1787. The prop trees he used were the moochy wood tree, Erythrina *corallodendron*. The French also found that this species of Erythrina and the Crescentia *cujete* are the only props to which the pepper takes kindly, and on which the fruit ripens.—Vide *Ann. du Mus. d'Hist. Nat.* t. i. p. 88. One thousand plants yield from 500 lbs. to 1000 lbs. of pepper.

duced on it by the friction. When it is over-ripe, and has fallen to the ground, the usual exterior coat falls off; and the pepper becomes an inferior white pepper.

Qualities.—Black pepper has an aromatic odour, and a hot, pungent taste. Its virtues are entirely extracted by ether and alcohol, and partially by water. The aqueous infusion is brown, and reddens vegetable blues; and the decoction of the ground pepper forms a precipitate with infusion of galls, which dissolves again when the fluid is heated to 120°. When the alcoholic infusion is distilled, a green, resinous, oily matter is left, which appears to be the source of the odour and the taste of the pepper. M. Pelletier[1] ascertained, that when this green fatty matter is washed in warm water, and again dissolved in hot alcohol, it deposits, after some days, a number of small crystals, which, when purified, are insipid, and have the singular property of imparting a blood-red colour to strong sulphuric acid. This substance, which has no affinity with alkalies, M. Pelletier named *piperin*: it crystallizes in four-sided prisms, of which the two opposite are broadest; the prism is terminated by an inclined face. The crystals are nearly colourless, or pale yellow, semi-translucent, tasteless; insoluble in cold water, sparingly in hot water; but soluble in alcohol and ether. Pelletier[2] found in pepper the following components:—Piperin; a very acrid, concrete oil, on which the acrimony of the pepper depends; a volatile balsamic oil; a gummy-coloured matter; extractive; malic and tartaric acids; starch; lignin; and earthy and alkaline salts. According to Pelletier piperin is a compound of carbon 70.51 + hydrogen 6·80 + oxygen 18·28 + nitrogen 4·51 = 100. Ether digested on powdered pepper takes up three parts in ten; and, when evaporated on water, deposits an intensely hot, biting, yellowish, oily resin, with the odour of the pepper, and insipid extractive matter. Black pepper, as sold in powder, is generally adulterated; often with the powdered husks of mustard, which are openly sold by the makers of mustard for this purpose, under the title of P. D. (*Pepper dust*).

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[1] *Annales de Chim. et Phys.* xvi. p. 20.

[2] Dr. Meli has proposed the following method of procuring pure piperin. Digest lb j. of black pepper, powdered, in O jss. of alcohol at 36°, in a gentle heat. Then raise it to ebullition; after which leave it to cool; and having poured off the fluid, repeat the operation with a fresh quantity of alcohol. Pour upon the mixed tinctures O j. of distilled water and f ℥jss. of hydrochloric acid. A fatty precipitate will fall down, which should be separated by filtration. The crystals which will form on the sides of the vessels and on the filter are pure piperin. Adding water till a precipitate ceases to be produced, a fresh quantity is obtained.—*Ann. Univ. di Med.* t. 27.

Medical properties and uses.—Black pepper is stimulant and carminative. Its use, as a condiment, is well known; and although in general it is useful to those who have a weak digestion, yet, even in small quantities, it proves injurious in inflammatory habits, and to those subject to piles.[1] As a medicine, pepper is found sometimes serviceable in checking nausea and vomiting, and removing hiccough. It is also used as a stimulant in retrocedent gout, and in palsy. The watery infusion forms a useful gargle in relaxation of the uvula, The *piperina* which it yields has been employed successfully by Dr. Meli and several Italian, French, and German physicians, in intermittents and other fevers: and is said to be as efficacious as the preparations of Quina: but this assertion still requires confirmation. A tincture of pepper made with gin, or with rum, has long been a popular remedy for agues.

The dose of black pepper may be from grs. x. to ℈ j.

Officinal preparations.—*Unguentum Piperis nigri,* D. *Emplastrum Meloes vesicatorii compositum,* E.

2. PIPER LONGUM.

Officinal. PIPER LONGUM, *Lond. Edin.* PIPER LONGUM; SEMINA, *Dub.* Long Pepper.

Syn. Poivre longue (*F.*), Lange pfeffer (*G.*), Lange peper (*Dutch*), Long peppar (*Swed.*), Pepe lungo (*I.*), Pimienta larga (*S.*), Pimenta longa (*Port.*), Darfilfel (*Arab.*), Pipel (*H.*), Tipilïe (*Tam.*), Pippāli (*San.*), Filfili draz (*Pers.*), Tabee (*Malay*), Chabijawa (*Jav.*).

This plant is a perennial, a native of Malabar and Bengal. The stems are round, smooth, branched, slender, and scandent: the leaves are commonly cordate, pointed, nerved, and of a deep green colour: the flowers are small, in dense, short, terminal spikes, nearly cylindrical. In other cirumstances the fructification agrees with the former species. The fruit consists of a very small one-seeded berries or grains imbedded in a pulpy matter, forming what Mirbel terms "*serose.*"

The fruit is hottest in its immature state, and is, therefore, gathered while green, and dried in the heat of the sun. It is imported in the entire spikes, which are about one inch and a half long, and indented on the surface.

Qualities.—Long pepper has a weak, aromatic odour, an intensely fiery, pungent taste, and a dark grey colour. Its constituents appear to be similar to those of black pepper. Ether, digested on powdered long pepper, takes up two parts

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[1] It nevertheless is an ingredient in a nostrum for the cure of piles, namely, *Ward's Paste,* which consists of ℔ j. of black pepper and elecampane, ℔ jss. of fennel-seeds, and of honey and sugar each ℔ j. beaten together and well mixed in a mortar. The dose is the size of a nutmeg three times a day.

and a half in ten parts, and when evaporated on water deposits a resin less hot than that of black pepper, but more permanent, and a smaller proportion of extractive. According to an analysis of Dulong, the constituents of long pepper are piperina, a concrete fatty matter in which the pungency and acrimony reside, a small portion of volatile oil, extractive, a coloured gummy matter, starch, a large quantity of bassorine, a malate, and some other saline substances.[1]

Officinal preparations.—*Confectio Opii*, L. D. *Pulvis Aromaticus*, L. D. *Pulvis Cretæ comp.*, L. D. *Tinctura Cinnamomi comp.*, L. E.

3. PIPER CUBEBA.

Officinal. CUBEBA, *Lond.* FRUCTUS, *Dub.* Cubebs.

Syn. Cubebes (*F.*), Kubeben (*G.*), Kobebar (*Swed.*), Koebeben (*Dutch*), Cubebi (*I.*), Cubebas (*S.*), Cobibas (*Port.*), Cubab chinie (*Hind.*), Komuchus (*Batavian*), Val Mellaghoo (*Tam.*), Duncke mirchie (*Duk.*), Komoonkoos (*Malay*), Salavamirrialoc (*Til.*), Kebabeh (*Arab.*), Walgummeris (*Cyng.*), Sirgandha marichum (*Sans.*), Kumukus (*Javan.*).

The plant which yields this spice is a native of Java, Nepaul, Batavia, Guinea, and the Isle of France. The younger plants differ from the older: their branches are long, creeping, and rooting; their leaves cordato-lanceolate, attenuated, about one and a half inch in length, and supported on petioles the length of the leaf. In the older plants the branches are flexuose and tetragonous; the leaves are less than an inch in length, unequal at the base, and supported on channelled footstalks half an inch in length. The fruit is a berry growing in clusters.[2]

Cubebs are brought to this country packed in cases. The best are about the size of a small pea, round, plump, and heavy. They have a short stalk attached to each, which appears to terminate in raised veins on the surface of the berry.

Qualities.—Cubebs when chewed have a pungent, aromatic, slightly bitter taste; which, however, leaves a sensation of coolness on the palate resembling that which is produced by peppermint. Their odour is fragrant and agreeable. According to Vauquelin, cubebs contain a volatile, almost concrete oil, a resin resembling that of copaiba, another coloured resin in small quantity, extractive, and some saline substances.[3] In our analysis we find that there are two volatile oils; one concrete in small quantity, the other fluid. They are readily obtained by distillation. The colour of the powder is darker than that of the berries. It should be kept in well-

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[1] *Journ. de Pharm.* Février, 1825.

[2] *Medical Repository*, Dec. 1820, p. 523.

[3] *Pract. Observ. on the Use of Cubebs in Gonorrhœa.* Lond. 1821.

corked bottles, and should even be dispensed in stoppered phials, as it quickly loses its active part when it is kept in paper. It is often adulterated with pimenta, which may be detected by the odour.

Medical properties and uses.—Cubebs are diuretic and slightly purgative. In gonorrhœa and gleets they have been long used by Oriental practitioners: and the Arabs employ them in seasoning food.[1] They have been found beneficial in this country in gonorrhœa, in which they moderate the inflammation, and consequently the discharge; this effect is soon apparent; and unless it be so the remedy is seldom useful.

The following statement of the results of fifty cases treated by Mr. Broughton, gives some idea of the time in which cubebs produce their effects, and of their value as a remedy in gonorrhœa:—

"Patients cured in from	two to seven days	10
- - -	eight to fourteen	17
- - -	fifteen to twenty-one	18
- - -	twenty-two to thirty	1
- - -	in fifty-five days	1
Patients in whom no sensible effects were produced		3
	Total	50"[2]

Mr. Jeffrey says that, even when they failed, he found the symptoms afterwards yield readily to copaiba; an observation which is confirmed by our own experience, and that of Mr. Broughton. They have also been lately given with advantage in inflammation of the mucous membrane of the intestines: and M. Velpeau has found them most beneficial in leucorrhœa.

The powder, which is the best form in which cubebs can be administered, sometimes nauseates: it acts as a diuretic in large doses; imparts an odour to the urine: and gives a cool sensation to the rectum, in passing the fæces. It sometimes, also, produces a quick pulse, a burning heat in the palms of the hands and the soles of the feet, flushing of the face, headachs, and frequently a slight degree of giddiness; occasionally urticaria; and, according to Dr. Duncan's experience, it has also produced swelled testicles.[3] The dose of the powder is from ℈j. to ʒj. four times in the day. Of the tincture, made by digesting ℥iij. of the bruised pepper in Oj. of

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[1] Martyn's Gardener's Dict. art. Piper.
[2] *Medico-Chirurg. Trans.* vol. xii.
[3] *Edinburgh Dispensatory*, 1830.

rectified spirit in wine, ʒj. may be given in a glass of water three times a day. The oil may be administered in doses of ♏xij. as an oleo-saccharum.

Officinal preparation.—*Tinctura Piperis Cubebæ*, D.

PISTACIA. *Spec. Plant. Willd.* iv. 752.

Cl. 22. *Ord.* 5. Diœcia Pentandria. *Nat. ord.* Anacardiaceæ.

G. 1782. *Male.* *Calyx* five-cleft. *Corolla* none.—*Female.* *Calyx* three-cleft. *Corolla* none. *Styles* three. *Drupe* one-seeded.

Species 4. P. *Terebinthus.* Chian Turpentine-tree. *Med. Bot.* 2d *edit.* 29. *t.* 12. *Du Hamel, Arbres,* ii. *t.* 87.

Species 6. P. *Lentiscus.* Mastich-tree. *Med. Bot.* 3d *edit.* 26. *t.* 11. *Du Hamel, Arbres,* ii. *t.* 136.

1. PISTACIA TEREBINTHUS.[1]

Officinal. TEREBINTHINA CHIA, *Lond.* RESINA LIQUIDA, *Dub.* Chian Turpentine.

Syn. Térébinthe de Chio (*F.*), Zyprischer Terebinthin (*G.*), Trementina de Cipro (*I.*).

The tree which yields the Chian turpentine is a native of Barbary and the south of Europe. It is cultivated in the islands of Chios and Cyprus, and also bears the severity of our climate; where, however, it is cultivated only as an ornamental tree, flowering in June and July. It is low in stature, sending off many spreading branches, and is covered with a smooth bark: the leaves are pinnate, composed of three pair of lanceolate, ovate, veined, entire leaflets, with a terminal one: the male and female flowers are on different trees. The *male* are in an amentum, with the calyx divided into five small, ovate segments; the filaments, four or five in number, very short, and supporting large, brown, erect, quadrangular anthers. The *female* are placed on a common peduncle in alternate order; consisting of a calyx of three small squamous segments, and an ovate germen crowned with two or three styles, with reflected clubbed stigmas. The fruit is subovate, reddish, smooth, and gibbous towards the top on one side.

The turpentine is gathered chiefly in Chios, by making incisions in the bark of the trunk of the tree, in the month of July. It is allowed to flow upon stones placed at the bottom of the tree, and after being condensed by the cold of the night, is scraped off the following morning before sunrise. It is then reliquefied by the heat of the sun, and strained to free it from any extraneous matter; and in this state is imported into this country in casks. On account of its high price, Chian turpentine is often adulterated with common turpentine.

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[1] Τέρμινθος Dioscoridis. *Der Terpentinbaum* (G.), *Terpentintrae* (Dan.), *Le Térébinthe* (F.), *Il Terebinto* (I.) *Cornicabra* (S., Port.), *Skipidarnoe derewo* (Russ.).

Qualities.—Chian turpentine has a fragrant odour, a moderately warm taste, devoid of acrimony or bitterness; and a white or very pale yellow colour: it has the consistence of thick honey, is clear, transparent, and tenacious; and in its other qualities, as well as its medicinal properties, resembles the other turpentines. See *Pinus.*

2. PISTACIA LENTISCUS.[1]

Officinal. MASTICHE, *Lond.* PISTACHIÆ LENTISCI RESINA, *Edin. Dub.* Mastic.

Syn. Mastic (*F.*), Mastix (*G.*), Mastice (*I.*), Almastiga, Almaciga (*S.*), Almaceda da India (*Port.*), Roomie Mustike (*Tam.*), Sakes (*Turk.*), Arah (*Arab.*), Kinneh (*Pers.*).

The lentisck, or mastich tree, is a native of the Levant, particularly the island of Chios. It flowers in May, and ripens its fruit in August.[2] It is a low tree, seldom exceeding twelve feet in height, and eight inches in thickness; is covered with a smooth brown bark; and towards the top sends off numerous branches: the leaves are abruptly pinnate; consisting of five or six opposite pairs of narrow, ovate leaflets, of a full lucid green colour on the upper, and a pale hue on the under side; they are sessile on the common footstalk, which has a narrow, foliaceous membrane or wing on each side, running from one pair of leaflets to the other. The male and female flowers are on distinct trees, and resemble those of the former species: the fruit is a drupe, containing an ovate smooth nut, of a brownish colour when it is ripe.

Mastic is most abundantly obtained in the island of Chios. Transverse incisions are made in the trunks and branches of the lentisck trees, from the 15th to the 20th of July, from which the mastic slowly exudes, some dropping on the ground, which is made smooth and hard as the pavement for the purpose of receiving it; and some remaining fixed on the trees, and hardening so as to require, for its detachment, the aid of a sharp iron chisel. In both instances it concretes into a yellowish, semi-transparent substance. It is not gathered until August, when fresh incisions are made; and a second gathering takes place about the middle of September: no more incisions are made after this period of the year, but the gathering is continued, twice a week, until the 19th of November.

The low trailing lentiscks yield the finest mastic, and in the greatest quantity. Chios exports annually about 1508

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[1] Σχινος Dioscoridis. *Der Mastixbaum* (G.), *Mastikboom* (Dutch), *Mastixtræ* (Dan.), *Lentisque* (F.), *Lentisco* (I., S., Port.), *Xihudia* (Turk.).

[2] It appears to have been cultivated in Britain so early as 1664. But it never attains here any degree of perfection.

cwts., part of which is brought to this country packed in chests.[1] That which is in the form of brittle grains is the best.

Qualities.—Mastic is almost inodorous, unless when rubbed or heated, when it exhales an agreeable fragrant odour. It is nearly insipid; and when chewed, at first crumbles, feeling gritty between the teeth, but by degrees becomes soft and white. When it is heated it melts. Ether dissolves it entirely; but in alcohol about one fifth remains undissolved, which has, when moist, the characters of caoutchouc[2], but becomes brittle when dried; and therefore apppears to be a peculiar vegetable principle. It appears to amount to nearly a fifth of the mastic.[3] In some respects this principle resembles the pure resins, being brittle, semi-transparent, fusible, insoluble in water, and soluble in ether; but it differs in being insoluble in alcohol. Mastic, when distilled with either water or alcohol, gives over very little with these liquids[4]; and this is perhaps an essential oil.

Medical properties and uses. — Mastic has generally been regarded as astringent and diuretic, and is ordered for the same diseases as turpentine: but its virtues, if it has any, are very trifling. The wood and leaves of the lentisck were used by the ancients in fluor albus and ulcerations of the uterus; and the Turkish and Armenian women use the mastic as a masticatory for cleaning the teeth, and giving an agreeable odour to the breath. It is employed to fill the cavities of carious teeth, for which purpose it is well adapted, from its property of softening in the mouth, and imparting little taste.

PIX ABIETINA. Vide *Pinus Abies.*

PIX LIQUIDA. Vide *Pinus sylvestris.*

PIX NIGRA. Vide *Pinus sylvestris.*

PLUMBUM, *Edin.* Lead.

Syn. Plomb (*F.*), Blei (*G.*), Lood (*Dutch*), Blye (*Dan.*), Bly (*Swed.*), Olow (*Polish*), Piombo (*I.*), Plomo (*S.*), Chumbo (*Port.*), Swinez (*Russ.*), Soorb (*Pers.*), Anuk (*Arab.*), Sisa (*H.*), Eeeum (*Tam.*), Sisaca (*San.*), Sheesh (*Duk*), Temaetain (*Malay*), Ak-kil-lĕ-iook (*Esquimaux*).

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[1] *Olivier's Travels* (translation), ii. 90. Olivier says, a soft mastic, having all the qualities of mastic, except in its consistence, which is that of turpentine, is procured by engrafting the lentisck on the Chian turpentine tree.

[2] *Crell's Annals*, 1794, ii. 185. *Thomson's Chymistry*, 4th edit. vol. v. 93.

[3] See Mr. Matthew's experiments, *Nicholson's Journ.* vol. x. 247.

[4] Hoffman (*Obs. Phys. Chim. Select.* p. 68.), however, states, that by rubbing the mastic in a mortar, with its weight of carbonate of potassa, and then distilling with alcohol, the liquid which comes over has both the smell and the taste of mastic.

This is a metal of a bluish grey colour, occurringi n great abundance in most countries of both hemispheres of the globe, in primitive, transition, and floetz formations.[1] It is found, A. in its metallic state:

i. Sulphureted.	Sp. 1. *Galena.*
	Var. *a.* Common.
	b. Compact.
	2. *Blue lead ore.*
a. and combined with antimony.	3. *Antimonial sulphuret.*
B. united with oxygen:	
ii. Oxides.	1. *Yellow oxide.*
	2. *Native minium.*
iii. combined with carbonic acid.	1. *Carbonate of lead.*
	2. *Earthy lead ore.*
	Var. *a.* Indurated.
	b. Friable.
	3. *Black lead ore.*
b. —— with hydrochloric acid.	4. *Murio-carbonate of lead.*
c. —— with phosphoric acid.	5. *Phosphate of lead.*
	Var. *a.* Brown lead ore.
	b. Green lead ore.
	6. *Arsenia-phosphate.*
d. —— with chromic acid.	7. *Chromate of lead.*
	Lead of Siberia.
e. —— with sulphuric acid.	8. *Sulphate of lead.*
f. —— with molybdenic acid.	9. *Molybdate of lead.*
g. —— with arsenic acid.	10. *Arseniate of lead.*

Galena is the ore from which metallic lead is commonly procured. When brought up from the mine, the ore is broken in pieces, and the impurities, which are mostly iron pyrites, quartz, calcareous spar, and clay, are separated by picking and washing: it is then exposed to a strong heat in a common reverbatory furnace till the sulphur is all separated, after which the metal is brought into a state of fusion; and some spadefuls of lime being thrown in, the scoriæ, which are thus rendered solid on the surface of the melted metal are raked to the side of the furnace, while the lead is run out into moulds through an aperture near the bottom; and in this state it is called *pig-lead.* It frequently contains silver which is separated by oxidizing the lead into litharge, and freeing the silver from what remains by cupellation.

Qualities.—Pure metallic lead is of a light bluish-grey colour, and immediately after being melted or cut has a very

1 The Harz mines yield annually 52 tons of lead. The Phœnicians exported lead from Cornwall and the Scilly Islands.—*Strabo,* l. iii. p. 175.

considerable degree of lustre, which it quickly loses on exposure to the air, owing to the formation of carbonate of lead on its surface. It is nearly insipid; and emits, when rubbed, a peculiar unpleasant odour. It stains the fingers and paper of a bluish colour, and has a specific gravity of 11·38, which is somewhat diminished after it is well hammered.[1] It is the softest and least elastic of the solid metals; and although its ductility be trifling, yet it is very malleable, and may be reduced into thin leaves and drawn into wire: it melts at a temperature of 612°[2], and at a greater heat is volatilized. Its susceptibility of oxidizement is very considerable: when it is exposed to the air at a high temperature, it is capable of uniting with three doses of oxygen, and forming three distinct oxides, each of which contains the following proportions of lead and oxygen[3]:—

	Lead.	Oxygen.	
Yellow (*protoxide*) contains	1 = 103·6;	1 = 8	= 111·6
Red (*sesquioxide*) - - -	3 = 310·8	4 = 33	= 342·8
Puce (*peroxide*)[4] - - -	1 = 103·6	2 = 16	= 119·6

Medical properties and uses.—Lead has no action on the animal system in its pure metallic taste: but when oxidized, or in combination with acids, it produces very deleterious effects. Hence, metallic lead taken into the stomach may prove a poison, from its meeting with carbonic acid in the primæ viæ; and liquors which are apt to become in any degree acidulous, if kept in leaden cisterns, may, from the same cause, be productive of much danger to those who drink them. I know an instance of the officers of an East Indiaman having been nearly poisoned from drinking water which was kept in a leaden cistern, and which by the constant agitation of it, from the rolling of the ship, had carbonized the lead; and there have been instances, also, of plumbers being poisoned by the volatilized particles of lead, which are supposed in great part to form into a grey oxide; but it is more likely that they form a carbonate. Distilled and rain water, kept in leaden cisterns, form a carbonate of lead, and thence become poisonous; but hard water, or water containing any saline matter, prevents this effect, by forming an insoluble compound with the lead, which protects it from the action of the air.[5] The greater number of cases of poisoning from this metal

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1 Muschenbroek.

2 Irvine, *Chymical Essays*, 35.

3 *Thomson's System of Chymistry*, 4th edit. i. 274—277.

4 This oxide was first discovered by Proust. Mr. Murray thinks there is reason for believing it to be a subsalt.—*System of Chymistry*, iii. 266.

5 See *Christison on Poisons*, p. 384.

are produced from the preparation of it we are about to describe; and, therefore, the mode in which lead acts on the animal system will be more properly noticed under it than in this place.

1. CARBONATE OF LEAD.

Officinal. PLUMBI CARBONAS, *Lond.* CARBONAS PLUMBI, *vulgo*, CERUSSA, *Edin. Dub.* Carbonate of Lead. White Oxide of Lead. Ceruse.[1]

Syn. Plomb carbonaté (*F.*), Bleiweiss (*G.*), Loot wit (*Swed.*), Cerussa (*I.*), Blanco de Plomo (*S.*), Asfeedās (*Arab.*), Suffida (*H.*), Vūllay (*Tam.*).

This substance, which is known in commercial language by the name of *white lead*, appears from the analysis of it by several of the most expert chymists, to be a carbonate of lead.[2] It is prepared in various ways, of which the following is one:—Sheets of lead, about two feet long, five inches broad, and a quarter of an inch thick, cast in a mould, and not afterwards flattened, are rolled up into loose coils, and placed in earthen pots, which are wider at the mouth than at the bottom. Each pot is capable of holding six pints of fluid; but into it as much vinegar only is poured as will rise so high as not to wet the lead, which rests on a ledge half-way down. In some manufactories, however, the pots are made to contain about a pint of vinegar only; and the lead, instead of being coiled up, is in form of a simple plate, which is laid over the mouth of the pot. The vinegar and lead being arranged, the pots are buried in fresh stable litter, where they remain for about two months; during which time the vapours of the vinegar, elevated by the heat of the dung, oxidixe the surface of the lead, converting it into the yellow oxide, which combines with the carbonic acid gas evolved from the fermented materials of the bed. The carbonate appears as a white, scaly, brittle matter, on the surface of the lead, and is separated "by spreading the coils upon a perforated wooden floor covered with water, and drawing them to and fro by rakes, which detaches the carbonate, and causes it to sink through the water and the holes of the floor to the bottom of a vessel placed below,"[3] In some places, this operation is performed by merely scraping off the carbonate with a knife. It is afterwards ground in mills fitted for the purpose. It was formerly ground dry, and the workmen suffered very severely; but it is now ground in water, and the carbonate is afterwards dried in earthen

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1 Σανδυξ Dioscoridis.

2 The various appellations given to this substance by the different colleges, arise from the indeterminate ideas which prevail of its composition.

3 *Aikin's Dictionary.*

pans placed in stoves, heated by means of flues. The beauty of the carbonate depends on the purity of the lead.

It is now more generally formed by passing a stream of carbonic acid through a solution of the acetate; and when the settling takes place it is dried in stoves, in glazed earthen pots. It is sometimes adulterated with whiting, and sometimes with sulphate of baryta.

Qualities.—Carbonate of lead is inodorous, and nearly insipid; in the form of a very heavy white powder, insoluble in water, but soluble in pure potassa. When exposed upon charcoal to the action of the blowpipe, a button of metallic lead is produced. Its constituents, according to Berzelius, are yellow oxide of lead 83·5, and carbonic acid 16·5, in 100 parts[1]; or 1 prop. of protoxide of lead$=111{\cdot}6+1$ of carbonic acid $=22{\cdot}12$, making the equivalent 133·72. Its adulteration with chalk may be discovered by pouring distilled vinegar on the suspected carbonate, and then adding oxalic acid, or oxalate of ammonia, to the solution. The formation of a precipitate proves the presence of chalk.

Medical properties and uses.—This preparation of lead is a very powerful astringent. It is used externally only, being sprinkled on inflamed and excoriated parts. Some writers, however, regard even its external employment dangerous: but we have ordered it a thousand times, without witnessing any bad effects to follow. It enters into the composition of some ointments.

It is from this preparation that most of the cases of poisoning from the internal use of the lead occur. Its effects as a poison were known to Galen. This often happens to painters, and to those employed in grinding white lead, from the want of cleanliness in not washing their hands before eating, by which some of the white lead is introduced into the stomach with their food: and it is this carbonate which is the poison, whether white lead or sugar of lead be put into acid wines for the purpose of sweetening them, and into hollands to deprive the spirit of the colour which it acquires when long kept in the wood. The symptoms which preparations of lead produce are obstinate costiveness, pain in the stomach, and vomiting: the pulse becomes small and hard; the respiration laborious; and tremors, ending in paralysis of the extremities, or death, ensue, when its operation is not counteracted by medicine. The exhibition of cathartics, particularly castor oil, and sulphate of soda or of magnesia, combined with opium or henbane, plentiful dilution with mucilaginous

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[1] *Annales de Chim.* lxxvii. p. 83.

liquids, the warm bath, and injecting mutton broth per anum, are the best antidotes: and if paralysis follow, recourse must be had to acetate of strychnia, administered in gradually augmented doses, commencing with half a grain, until tetanic twitches display themselves. Galvanism will also be found useful.

When the presence of any salt of lead is suspected in a dry substance, it may be discovered by reducing it to a metallic state with the blowpipe upon charcoal; if in a liquid, by pouring into the suspected solution a solution of sulphureted hydrogen gas[1], when the lead is made obvious by a dark brown precipitate, which is insoluble in tartaric acid, the salt of lead being formed into an insoluble sulphuret. This sulphuret should be next washed and digested in nitric acid, diluted with twice its weight of water. This nitrate being brought to dryness by heat, to expel any nitric acid, should be dissolved, and hydriodate of potassa dropped into the solution; if it be lead, a yellow iodide will be formed.

Officinal preparations.—*Plumbi Acetas,* L. E. D. *Unguentum Cerussæ,* D.

2. Semi-vitrified Oxide of Lead.

Officinal. Plumbi Oxydum, *Lond. Edin. Dub.* Litharge.

Syn. Litharge (*F.*), Bleiglätte (*G.*), Loot glans (*Dutch*), Silwer-glitt (*Swed.*), Piombo semi-vitreo (*I.*), Almastago (*S.*), Marudar Singhie (*Tam.*), Moordar singh (*Pers. Duk. Hind.*).

This oxide is prepared by the simple action of heat and air upon lead. It is generally obtained during the calcination of lead, when separating the silver with which this metal is often combined. The lead is placed in a wind furnace, on a large cupel, or hollow dish made of ashes, and kept at a red heat with the blast of a large pair of bellows directed upon its surface; a scaly, yellowish white, glistening oxide is soon produced, and successively formed by raking it off and exposing new surfaces till the whole of the lead is thus converted into litharge.[2] The varying of the circumstances of the process varies the colour of the oxide: some kinds of it, from having a silvery gloss, are denominated litharge of silver; and others, from the colour being a reddish yellow, litharge of gold.

Qualities.—Litharge is inodorous and insipid: it is in flakes with a vitreous lustre; dissolves in many of the acids:

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[1] To prepare this solution, put into a phial a paste made of iron filings and sulphur; then after some time add to it a small portion of sulphuric acid, and receive the gas which is produced, through a bent tube connected with the phial, into a flask filled with distilled water, and inverted in a basin or pneumatic trough full of water.

[2] The Harz mines yield annually 70 tons of litharge.

and is a protoxide, containing 103·6 parts of lead and 8 of oxygen, or 1 proportion of each = 111·6. For an account of the action of this oxide on fixed oil, see *Plasters.*

Medical properties and uses.—Litharge, like the other preparations of lead, is a powerful astringent. The ancients were acquainted with it.[1] It is never given internally; and is used only for pharmaceutical purposes. Litharge is sometimes added to wines which are sour. It may be detected either by passing sulphureted hydrogen gas through the suspected wine; or evaporating this to the consistence of syrup, and then reducing the lead with charcoal, in a crucible. In all cases of poisoning by salts or oxides of lead the best antidote is a solution of magnesiæ sulphas, with the addition of some sulphuric acid; which, uniting with the deleterious salt of lead, forms an inert sulphate of lead, which is carried out of the bowels by the sulphate of magnesia.

Officinal preparation.—*Emplastrum Plumbi,* L. E. D.

3. SESQUIOXIDE OF LEAD.[2]

Officinal. OXYDUM PLUMBI RUBRUM, *Edin.* Red Oxide of Lead.

Syn. Minium (*F.*), Mönnige, Mennig (*G.*), Minio (*I.*), Vermillon (*S.*), Isrenj (*Arab.*), Sindur (*H.*), Segāpoo Sindoorum (*Tam.*), Sindura (*San.*), Temamera (*Malay*).

This preparation is lead in the highest state of oxidizement. It is prepared in a reverberatory furnace, vaulted like a baker's oven, and having two internal walls rising from the floor, but not reaching to the roof. The coals are placed between these internal walls and the wall of the furnace, by which means the flame is drawn over the top, and reflected from the roof down upon the surface of a quantity of lead placed on the floor. The metal soon melts, and is altogether converted into a yellow oxide, or *massicot*, by successively raking off the pellicles which form on its surface: this is then ground in a mill, and washed, to separate any metallic lead, by which it becomes of a uniform yellow colour, and, after being replaced in the furnace, is exposed to the flame while it is constantly stirred for about forty-eight hours, when it is converted into red oxide of lead.[3] By this process, 20 cwts. of lead produce on an average 22 cwts. of red lead, notwithstanding a portion is necessarily volatilized. To save the previous calcination, litharge is sometimes employed.

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[1] It was known to Dioscorides, Ætius, and others, but we have no records of its employment as a medicine until 1541, when it was prescribed by Paracelsus.

[2] Ψιμμυθιον Dioscoridis.

[3] *Watson's Chymical Essays,* iii. 338. *Aikin's Dictionary.*

Qualities.—Red oxide of lead, the *minium* of commerce, is inodorous and insipid; in the form of a very heavy, scaly powder, its specific gravity being 8·940[1]; and of an intense red or scarlet colour, verging into orange. When heated to redness, it gives out oxygen gas, and runs into a dark-brown, hard glass. It is a sesquioxide, containing 310·8 parts or 3 equivalents of lead + 32, or 4 of oxygen = 342·8.

Medical properties and uses.—Red lead may be applied to the same uses as litharge, but is now rarely or never used. Its chief use is in the arts, as a pigment.

POLYGALA. *Spec. Plant. Willd.* iii. 871.

Cl. 17. *Ord.* 3. Diadelphia Octandria. *Nat. ord.* Polygaleæ.

G. 1313. *Calyx* five-leaved, with two of the leaflets wing-shaped, and coloured. *Legume* obcordate, two celled.

*** *Beardless; herbaceous, with a simple stem.*

Species 67. P. *Senega.* Seneka root. *Med. Bot. 3d edit.* 452. *t.* 162. *Amœn. Acad.* iii. 124. *Pursh.* iii. p. 464.

Officinal. SENEGÆ RADIX, *Lond.* POLYGALÆ SENEGÆ RADIX, *Edin. Dub.* Seneka root.

Syn. Polygale de Virginie (*F.*), Senegawurzel (*G.*), Poligala Virginiana (*I.*).

This plant is a perennial native of North America, flowering in June.[2] The root is woody, branched, contorted, about half an inch thick, and covered with ash-coloured bark: it sends up several stems a foot in height, erect, slender, round, smooth, and of a dark reddish colour. The leaves are petiolate, alternate, lanceolate, acute, and pale green: the flowers are in loose, terminal spikes, small, white, and papilionaceous, with the calyx divided into three narrow, persistent segments: the fruit is an inversely cordate capsule, containing several small seeds.

The root is brought from Virginia in bales, each containing from two to four hundred weight.

Qualities.—Seneka root is inodorous: the taste is at first sweetish and nauseous; but after being chewed for less than a minute, becomes pungent and hot, producing a very peculiar tingling sensation in the fauces. These qualities reside in the bark; which, on the dried root, is white within, and covered with a brownish grey, corrugated, transversely cracked cuticle: the central part is white, but woody and inert: alcohol extracts the whole of its active matter, which is precipitated from the tincture by the addition of water; and the ethereal tincture deposits a pellicle of resin, but no extractive. From six ounces of the root Peschier separated 100 grains of a peculiar alka-

[1] Muschenbroek.

[2] It was first cultivated in England by Mr. F. Miller, in 1759.

line principle, which he has named *Polygalina*, united with a new acid, which he has denominated the *Polygalinic;* and this salt he supposes is the active principle of seneka root.[1] Hot water extracts its virtues partially only; but in a sufficient degree to exert its influence on the animal system.

Medical properties and uses.—This root is a stimulating expectorant and diuretic; and, in large doses, emetic and cathartic: it increases absorption, and consequently augments the natural excretions, particularly that of urine; and frequently occasions a copious ptyalism. It was introduced to the notice of physicians by Dr. Tennant, who, having discovered that it was the antidote employed by the Senagaro Indians against the bite of the rattlesnake, and reasoning from the effects of the poison, and of the remedy in removing these, was induced to try it in pneumonic affections, and found it useful. On account of its stimulant properties, however, it can be employed in these complaints only after the resolution of the inflammation by bleeding and evacuations. It proves more directly useful in humoral asthma, chronic catarrh, and some kinds of dropsy; and has been found very efficacious in rheumatic and scrofulous ophthalmia, even after pus had appeared in the anterior chamber.[2] The extract of it combined with carbonate of ammonia has been found by Dr. Brandreath, of Liverpool, to be efficacious in some cases of lethargy; and in America the decoction given in divided doses, at short intervals, till it vomit or purge, has been employed with seeming success in croup[3]: it has also been used as a stimulant gargle in the same disease.

It may be administered either in the form of powder or decoction, combined with aromatics, opium, or camphor, which check its nauseating qualities. Madeira wine, where it can be ordered, may be used to cover the taste of the powder. The dose in substance is from grs. x. to ʒj., repeated every three or four hours.

Cartheuser recommended the root of this plant in incipient cataract. Dr. Schmalze of Dresden found it very useful in all inflammatory affections of the eye which are followed by a morbid secretion from that organ, rheumatic ophthalmia, catarrhal ophthalmia, erysipelas of the eye, different species of iritis, with the exception of those arising from syphilis. It is contra-indicated in scrofulous affections, at least those accompanied with morbid exudations of the cornea. It is very salutary in hypopyon, at the moment when the disease

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[1] *Pharmacopœia Batava*, &c. *editione de Joanne Frid. Neimann.* Lipsiæ, 1824.
[2] *Med. Repository*, vol. iv. (New Series), p. 56.
[3] *London Medical Review and Magazine*, iii. 426.

is passing from the inflammatory to a state of exudation. It is given in pills containing soap, and may be carried to one grain and a half per day; the evident effect is the production of fluid stools without colic.

Officinal preparation.—*Decoctum Senegæ,* L. E.

POLYGONUM. *Spec. Plant. Willd.* ii. 440.

Cl. 8. *Ord.* 3. Octandria Trigynia. *Nat. ord.* Polygonaceæ.
G. 3. *Corolla* five-parted, calycine. *Seed* one, angular.
* * *Bistorts, with a single spike.*
Species 3. P. *Bistorta.*[1] Great Bistort or Snakeweed. *Med. Bot. 3d edit.* 668. *t.* 232. *Smith, Flora Brit.* 427. *Eng. Bot. t.* 509.
Officinal. POLYGONI BISTORTI RADIX, *Edin. Dub.* Bistort root.

Syn. Bistorte (*F.*), Natter-Wurzel (*G.*), Natter-Wortel (*Dutch*), Bistorta (*I. S. Port.*), Slangeort (*Dan.*), Sertechnaja trawa (*Russ.*).

This plant grows in many parts of Europe, Siberia, and Japan, and is indigenous to Great Britain; found generally in moist meadows, flowering in May and June.[2] The root is perennial, woody, and tortuous: the stem rises nearly two feet in height, is foliaceous, jointed, swelling at the joints, solid, smooth, and bending a little near the top: the leaves are ovate, those next the root cordato-lanceolate: the whole are entire, waved at the edge, veined, of a fine green colour on the upper surface, and glaucous below; the radical ones are on long, winged footstalks, those of the stem almost sessile, amplexicaule, and sheathing. The flowers are small, of a pale rose-colour, collected into a close, oblong, terminal spike, an inch and a half long; the single flowers standing on short white flower-stalks, which rise in pairs from membranous, withering, floral leaves. The corolla is divided into five obtuse segments, with nectareous glands at the base: the filaments are longer than the corolla, tapering, and supporting purple anthers; and the germen is triangular, of a red colour, crowned with three long styles, with small round stigmas. The seeds are three-sided, of a dark brown colour, and shining.

Qualities.—The dried root is inodorous, and has a very austere taste. Water extracts its virtues. The decoction strikes a deep black with persulphate of iron, and precipitates gelatine. It contains a large proportion of tannin, some gallic acid, and much starch.

Medical properties and uses.—The root of bistort is astringent and tonic. It is employed in hæmorrhages, obstinate

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[1] Bistorta, *quasi* bis torta, twice twisted.—*Alston, Mat. Med.* vol. i. 399.

[2] It is, however, not confined to low situations, being found on the Carpathian Alps, vegetating under *pinus magnus,* at an elevation of 4476 feet. Vide *Wahlenberg's Flora Carpatorum.*

fluxes, leucorrhœa, and all diseases in which simple astringents are indicated. It has also been given in intermittents, combined with gentian, or acorus calamus. Externally, a strong decoction of it is a useful lotion for spongy gums and ill-conditioned ulcers. But it is almost discarded from modern practice.[1]

The dose of the powdered root is from grs. xv. to ʒj., twice or thrice a day.

PORRI RADIX. Vide *Allium Porrum.*

POTASSÆ BITARTRAS, *Lond.* SUPERTARTRAS POTASSÆ, *Edin.* POTASSÆ BITARTRAS SEU TARTARI CRYSTALLI, *Dub.* Supertartrate or Bitartrate of Potassa, Crystals of Tartar.

Syn. Tartrate acidule de Potasse (*F.*), Weinsteinrahm (*G.*), Wynsteenroom (*Dutch*), Cremore di tartaro; ossitartrato ossidulo di Potassa (*I.*).

This is the saline crust deposited on the sides of casks of wine, purified. It is first reduced to powder, then dissolved in boiling water in tubs, and the clear fluid poured off from the sediment. The clear solution is then allowed to remain at rest, when it deposits brown crystals of tartrate of potassa, which are boiled in copper vessels with the mother liquor; and clarified by throwing in whites of eggs, and some finely sifted wood-ashes. An effervescence immediately takes place, and a red scum is thrown up, which is carefully skimmed off with a perforated skimmer; and the throwing in of the wood-ashes, with the subsequent skimming, are repeated for fourteen or fifteen times; after which the liquor is taken from the fire, and allowed to remain at rest for three days. On the fourth day, a dirty white saline crust is removed from the surface, and two thirds of the liquor ladled out. The crystals which now form are white and clean, and require no farther preparation than drying on a wicker frame. In some places, instead of wood-ashes, a portion of pure clay is diffused through the boiling solution. The exposure of the crystals on cloths to the air and light whitens them very considerably.[2]

Qualities.—Bitartrate of potassa is inodorous; and when allowed to dissolve in the mouth, which it does very slowly, and feeling gritty under the teeth, has a harsh acid taste. Its crystals are small and irregular six-sided prisms, generally run together into little masses, which are of a white colour, semi-transparent, brittle, and easily reduced to powder. Its

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[1] In Iceland the recent root of bistort is eaten raw, or converted into bread. It may, therefore, be reasonably enquired, What effect can it have as a medicine, when prescribed in the small doses usually ordered?

[2] Schauh says, it may be purified by simply boiling it with powdered recent charcoal, and very white crystals obtained. *Annales de Chimie*, xlix. 64.

specific gravity is 1·953. It requires for its solution 30 parts of boiling water, and 120 of cold water. The solution decomposes spontaneously by keeping: a mucous matter is deposited, and there remains a solution of carbonate of potassa, coloured with a little oil.[1] According to the analysis of Thénard, 100 parts of pure bitartrate of potassa contain 57 of tartaric acid, 33 potassa, and 7 of water[2]: according to Berzelius, the proportions are, acid 70·45, potassa 24·80, and water 4·75; while Mr. Brande states them to be, acid 73·64, potassa 26·4. In equivalents its constituents are 1 eq. of potassa = 47·15 + 2 tartaric acid = 132·96 + 1 water = 9, equivalent 188·96. Mr. Brande remarks that it is doubtful whether this salt contains any definite water of crystallization.[3]

Medical properties and uses.—This salt is purgative and refrigerant. As a purgative it is frequently employed, on account of its taste being less unpleasant than the generality of saline cathartics: but it is apt, when long used, to produce emaciation, chiefly owing to its powerful action on the intestinal exhalants. This property is taken advantage of with great effect in the treatment of dropsy, particularly ascites; in which the bitartrate of potassa has been found extremely efficacious. It occasions a considerable discharge of serous fluid into the bowels, which is thrown off in the form of watery stools, in which case the discharge by urine is not augmented. The water in the cavity of the abdomen is, however, thus rapidly carried off; and the chances of a return of the disease are supposed to be fewer than when diuretics are employed. We are of opinion, however, that in cases complicated with hepatic obstructions the effects of this remedy are very uncertain. It may be advantageously united with squill; and, owing to the exhaustion it occasions, its use should be followed by preparations of iron, and other tonics. As a refrigerant, bitartrate of potassa dissolved in water, and the solution sweetened with sugar, is a pleasant beverage in febrile diseases, when its purgative quality is not likely to prove injurious. As a purgative and hydragogue the dose is from ʒ iv. to ʒ vj., in the form of electuary; but this dose is too large in ascites: not more than ℈ j. is necessary.

Officinal preparations.—*Ferrum Tartarizatum*, L. D. *Potassæ Tartras*, L. E. D. *Antimonium Tartarizatum*, L. E. D. *Soda Tartarizata*, L. E. D.

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[1] This decomposition was first described by Berthollet, in 1782. *Mem. Par.* *Thomson's Chymistry*, 4th edit. vol. iii. p. 93.

[2] *Annales de Chimie*, vol. xxxviii. p. 39.

[3] *Manual*, p. 142.

POTASSÆ CARBONAS IMPURA. *Lond.* SUBCARBONAS POTASSÆ IMPURUS, *Edin.* LIXIVIUS CINIS[1], *Dub.* Impure Carbonate of Potassa. Impure Subcarbonate of Potassa. Potashes. Pearl-ashes.

Syn. Carbonate alkalinule de Potasse (*F.*), Koloensuares Kali, Pottasche (*G.*), Potash (*Dutch*), Potaske (*Dan.*), Potaska (*Swed.*), Potassa del Commercio (*I.*), Cenizas claveladas (*S.*), Marra Ooppoo (*Tam.*), Hindee loonoo (*Cyng.*), Jhār ka némuck (*Duk.*), Kshāra-lavana (*Sans.*).

This substance consists chiefly of subcarbonate of potassa, mixed with some other salts. It is known in commerce by the name of potash; and is brought to us principally from the Baltic and America.[2] The manipulation of the process by which it is prepared differs in different countries; but the general features of it are every where the same. The dried stems and branches of plants are set fire to, and reduced to ashes; which are lixiviated by pouring over them, in proper vessels, hot or cold water, so as to dissolve the alkaline matter they contain. The impregnated solution, drawn off from the ashes, is then boiled to dryness in iron boilers, and leaves behind a solid saline mass, coloured brown by a small portion of vegetable inflammable matter, and which generally becomes moist. This is the *potash* of commerce. After the colouring matter is destroyed, and a portion of the water dissipated by calcination in a reverberatory furnace, it assumes a spongy texture, with a bluish or greenish colour, and is then denominated *pearl-ashes.*

Those vegetables only which grow at a distance from salt water are employed to obtain this product. Herbaceous plants yield the largest proportion, and shrubs more than trees. Kirwan remarks, that although fumitory produces more of this salt than any other plant, and next to it wormwood, yet, that 1000 parts of the ashes of wormwood yield more potassa than the same quantity of the ashes of fumitory, in the proportions of 748 and 360. It has been said that it was lately obtained in great abundance from the herbaceous part of the potato, cut down just as the fruit is beginning to form: 40,000 lbs. of the dried stems, it has been stated, will yield 2200 lbs. of impure potassa; but the trials in this country have not confirmed these statements.[3] It is generally supposed, that at least the greater part of the potassa is contained ready-formed in the vegetables; but this is somewhat doubtful, and perhaps in living plants the base only of potassa

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[1] Of these three appellations, that of the Dublin College is the least exceptionable, because it does not convey an erroneous idea of the nature of the substance, which is the case with the others.

[2] Brunswick makes about 80 cwts. of potassa yearly.

[3] *Phil. Mag.* vol. i. p. 340.

exists as an element, and is oxidized so as to form the alkali during the combustion. Such is the conjecture of Dr. Murray[1]; and the same may take place during the spontaneous decomposition of plants where much water is present, for potassa can be obtained by the evaporation of dunghill water.[2]

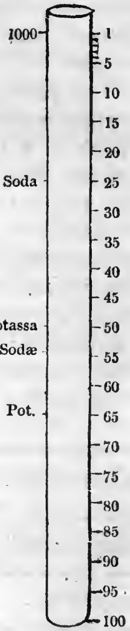
The pearl-ash of commerce is still a very compound mass, containing, besides the subcarbonate of potassa, sand, with which it is often adulterated to a great extent, sulphate of potassa, chloride of potassium, oxide of iron, and oxide of manganese; to the last of which, according to Scheele, it owes its bluish or greenish colour. Different parcels of pearl-ash must undoubtedly contain different quantities of potassa; and thence no accurate standard of the proportion of the ingredients can be fixed. The following table, drawn up by Vauquelin, shows the comparative value of samples from different countries examined by him. The quantity of each was 1152 parts.[3]

Kinds of Potassa.	Real Potassa.	Sulphate of Potassa.	Hydrochlorate of Potassa.	Insoluble Residue.	Carbonic Acid and Water.
Russian potash	772	65	5	56	254=1152
American do.	857	154	20	2	119=1152
Pearl-ash	754	80	4	6	308=1152
Potash of Treves	720	165	44	24	199=1152
Dantzic potash	603	152	14	79	304=1152
Potash of Vosges	444	148	510	34	304=1152

The proportion of real alkali in any quantity of pearl-ash may be ascertained in the following manner:—Pulverize 100 grains of the pearl-ash, and digest in successive portions of hot water as long as anything is dissolved; filter to separate all the insoluble matter; and add sulphuric acid, according to Mr. Faraday's *alkalimeter*, in successive small quantities, until litmus paper shows that the whole of the

1 *Murray's Chymistry*, 2d ed. ii. 193.
2 See Birch's Experiments, *Phil. Trans.* for 1780, p. 345.
3 *Annales de Chimie*, xl. 284.

alkali is neutralized. The quantity of the diluted acid contained in each division of the tube, which has been used indicates one grain of potassa.[1] The alkalimeter is a tube $9\frac{1}{2}$ inches long, and $\frac{3}{4}$ of an inch in diameter. It is graduated by pouring into it 1000 grains of water, and marking the point to which it reaches with a file or diamond: divide the space occupied by the water into 100 equal parts; and write the words in the marginal cut opposite to the numbers 23·44—48·96—54·63 and 65. To use the tube, prepare a diluted acid of 1·127 sp. gr. at 60°, by mixing one measure of concentrated sulphuric with eight measures of distilled water: pour as much into the tube as will reach the mark 48·96: this quantity should neutralize 100 grains of potassa; so that, by proceeding as above described, we readily ascertain the quantity of real potassa present in the specimen of pearl-ashes.



The pearl-ash of commerce is not sufficiently pure for medicinal use; and therefore it is used only for pharmaceutical purposes.

Carbonate of potassa is also procured by calcining bisulphate of potassa with charcoal in a reverberatory furnace: a sulphuret is formed, which is decomposed by roasting; the sulphur is dissipated, the potassium is oxidized, and the potassa combined with carbonic acid.

Officinal preparation.—*Potassæ Carbonas,* L. E. D.

POTASSÆ CHLORAS, *Lond.* Chlorate of Potassa.

This salt is made by passing a stream of chlorine through a concentrated solution of pure potassa until the alkali is completely neutralized. In this case, the potassa is decomposed, and the oxygen of five equivalents combining with one equivalent of chlorine, form the chloric acid, which uniting with the undecomposed potassa forms the chlorate of that salt; whilst the five equivalents of potassium set free combining with five equivalents of chlorine, form the chloride. The solution is then boiled for a few minutes to expel any excess of chlorine, and allowed to cool. In this state it con-

[1] The value of the diluted acid must be previously ascertained, by adding to 100 grains of it chloride of barium as long as any precipitate falls. This forms sulphate of baryta, which, when washed, and dried at a low red heat, contains 33·3 per cent. of sulphuric acid; by which the proportion of real acid in the diluted acid may be known.—*Aikin's Dictionary,* i. 263.

tains both chloride of potassium and chlorate of potassa; but, as the latter is much less soluble than the former, the chlorate crystallizes, whilst the chloride still remains in solution. The crystals, thus procured, require to be washed in cold water and recrystallized.

Qualities.—Chlorate of potassa is an inodorous white salt of a pearly lustre: its taste is cool and austere: it crystallizes in four and six sided scales, which require sixteen parts of water at 60°, and two and a half at 212°, for their solution. At a temperature of 400° to 500° it undergoes the igneous fusion; and at 666° it is decomposed, and pure oxygen gas is disengaged. It contains no water of crystallization. It is a compound of 61·228 parts of chloric acid + 38·772 of potassa in 100 parts; or 1 equiv. chloric acid = 75·42 + 1 potassa = 47·15, making the equiv. = 112·67.

Medical properties and uses.—Chlorate of potassa is a stimulant tonic. It is little employed; but it may be advantageously prescribed to rouse the energies of the system in typhus and other depressing affections. It was at one time employed in the treatment of syphilis, but it has deservedly fallen into disrepute in that disease. The dose of the salt is from grs. vj. to ℈j. in solution, three times a day.

POTASSII FERROCYANIDUM, *Lond.* Ferrocyanide of Potassium.

This salt is prepared by calcining at a red heat a mixture of hoofs, horns, or blood, and impure potassa, in an iron vessel: a black carbonaceous mass is procured. The soluble parts are dissolved in water, and sulphate of protoxide of iron is added, until the Prussian blue which is formed ceases to be decomposed by the free potassa in the solution. The ferrocyanide is then crystallized, and procured free from sulphate of potassa, by repeated solution and crystallization.

Qualities.—Ferrocyanide of potassium is procured in large, translucent, four-sided tabular crystals, of a fine yellow colour, permanent in the air. It is inodorous; has a saline taste; water at 60° dissolves about one third, at 212° its own weight of the salt: it is insoluble in alcohol. When heated at a temperature of 212°, it loses its water of crystallization, 12·82 per cent., and becomes white; but recovers it in a moist temperature. When strongly heated in a retort, it is decomposed, giving off ammonia and hydrocyanic acid, whilst carbonate of potassa and sesquioxide of iron remain as a residue. It is a compound of 2 eq. cyanide of potassium = 131·08 + 1 eq. cyanide of iron = 54·39 + 3 eq. water = 27, making the equivalent 212·47. It is incompatible with proto and sesqui salts of iron, and salts of iron.

Medical properties and uses.—Ferrocyanide of potassium operates as a sedative, an astringent, and a diuretic. It is rarely employed in this country: but in America it is prescribed to reduce the pulse and allay pain. Dr. Smart[1] prescribed it successfully in a case of chronic bronchitis in a child; it lowered the pulse, relieved the dyspnœa, and diminished the frequency and hardness of the cough. Dr. Smart has also found it useful in hooping-cough. Its astringent influence is manifested in checking sweats, the colliquative in chronic bronchitis and phthisis, and in lessening the discharge of leucorrhœa.

This salt may be administered in solution (ʒij. to f℥j. of water) in doses of ♏ xxx. to xl. to an adult, every four or five hours. When ove dosed it causes vertigo, coldness, numbness, and a sensation of sinking.

Officinal preparation.—*Acidum Hydrocyanicum dilutum*, L.

POTASSÆ NITRAS, *Lond.* NITRAS POTASSÆ, *Edin. Dub.* Nitrate of Potassa. Nitre.

Syn. Nitre, Nitrate de Potasse (*F.*), Salpetersaures kali (*G.*), Salpeter (*Dutch, Dan. Swed.*), Saletra (*Polish*), Nitro (*I. S. Port.*), Salitre (*S.*), Selitra (*Russ.*), Pottle Ooppoo (*Tam.*), Shora (*Pers.*), Sandaiva (*Malay*), Ubkir (*Arab.*), Wedie looneo (*Cyng.*), Shora (*H.*), Yavac Shora (*San.*).

This salt is well known in commerce under the name of saltpetre or nitre. It may be regarded both as a natural and artificial production: being found effloresced on the surface of the soil in Hungary[2] and some parts of Europe[3], South America, Africa[4], and very abundantly in India[5], whence this country is chiefly supplied; while in some countries, as in Germany and France, it is artificially produced. Nitre is prepared by art by the same means as nature employs, the artificial composts being imitations only of the natural soils where it is most abundantly formed; by giving, therefore, an account of the former mode, both will be better understood. Glauber first suggested the formation of what are termed nitre-beds. In France they consist of a compost of putrefying animal and vegetable matters, such as blood, offal, ex-

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[1] *Amer. Journ. of Med. Scien.* vol. xv. p. 362.

[2] *Beudant's Travels in Hungary.*

[3] A great repository of native nitre in Europe is the Pulo of Molfelta, in the province of Puglia, in the kingdom of Naples. It is a deep cavity formed by the falling in of several caverns. The Abbé Fortis first drew public attention to this place, at which time it was lined with a crust of nitre an inch thick, which on being scraped off was successively renewed in a few days.

[4] Near the city of Tlemsan, in the kingdom of Algiers, six ounces of nitre are extracted, by simple lixiviation, from one quintal of the common mould.—*Shaw's Travels*, p. 228.

[5] The presidency of Calcutta exports annually upwards of 8000 tons of nitre.

crementitious matters, and decaying leaves, with street-sweepings, old mortar, chalk, and other calcareous matter; which are mixed in casual proportions, and lightly spread in long beds, covered with roofs to protect them from the weather. These are turned up occasionally, frequently moistened with putrid water or urine; and at the end of two years, or less, are supposed to be fit to yield the nitre by lixiviation. The theory of this process, which is not yet completely elucidated, was not at all understood till the experiments of Thouvenal, and the discovery of the composition of nitric acid by Mr. Cavendish, removed much of the obscurity in which it was involved: the following is the explanation. The spontaneous decomposition of the animal and vegetable matter evolves nitrogen, oxygen, hydrogen, and carbon, which reuniting by the operation of new affinities, new compounds are formed; and among these nitric acid, by the union of the nitrogen from the animal substances with the oxygen from the vegetable matter. The acid thus formed is attracted partly by the calcareous earth of the beds, and partly by a portion of potassa, either contained in them ready formed, or, as some have supposed, formed during the process. The presence of animal matter, although it aid the formation of nitre, yet is not essential; for Dr. J. Davy found a rich impregnation of nitre in a nitre-cave near Mensoora, in the district of Doombera, in Ceylon, in a decomposing rock consisting of calcspar, felspar, quartz, mica, and talc, in a humid state, exposed to the air, and perfectly free from any animal matter.[1] The presence of a certain degree of heat and humidity, of atmospheric air, of lime and some alkaline mineral, is absolutely necessary; for besides fixing the nitric acid when formed, the affinities lime exerts to oxygen and nitrogen favour very much their combination, and consequently the formation of the acid.

The compost, when ready to be lixiviated, is first mixed with wood-ashes, or with pulverized impure potassa, to decompose the nitrate of lime. It is then put into a cask furnished with a cock at the bottom, and an inner, false, perforated bottom; a quantity of river water is now poured over it, and after some hours the cock is turned, and the liquor drained off, which is used instead of water for a second portion of earth; and this is successively repeated, till it is supposed to be sufficiently impregnated with the soluble matter of the compost. The lixivium, which contains chiefly nitrate of potassa, and

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[1] *Davy's Account of the Interior of Ceylon,* 4to. p. 32. Lond. 1821.

the hydrochlorates of potassa and of soda, is now boiled and clarified with bullocks' blood or a solution of glue; and the boiling continued, the hydrochlorates as they form being withdrawn by perforated ladles, till the liquor is so concentrated that a few drops poured on cold iron immediately crystallize. It is then, when nearly cold, poured into separate crystallizing dishes, in which after some days the salt is found deposited in a confused mass of opaque, dirty white, imperfect crystals, which, after being broken to pieces and drained, are known under the name of rough or crude nitre, or crude saltpetre.

Nitre is brought from Bengal in an impure state, but crystallized, put up in bags, each containing two bazar maunds, or 164 lbs. weight.[1] The crystallized state of this impure nitre arises from the lixivium of the soil having been slowly evaporated in shaded, shallow pits. To purify crude nitre, it is repeatedly washed with cold water, which dissolves the deliquescent hydrochlorates: and then is boiled with half its weight of water, until a pellicle forms on the surface; after which the solution is poured into leaden coolers, and stirred till it is quite cold, by which means the salt is deposited in acicular crystals.[2] Different processes are employed in different places.

Qualities.—Pure nitrate of potassa is inodorous; and has a bitterish, sharp taste, occasioning a sensation of cold both in the mouth and stomach. It is generally in white, pellucid, brittle, sixsided prisms, terminated by two-sided summits, the specific gravity of which is 1·933. These crystals are soluble in seven parts of water at 60°, producing cold during their solution; but boiling water takes up its own weight of them. They are perfectly insoluble in strong alcohol. They are permanent in the air, melt when exposed to a moderate heat, and when cast into moulds form *Sal Prunelle.* They contain no water of crystallization, but water is generally entangled in them. In a strong heat it undergoes the igneous fusion; oxygen gas is disengaged at first, and afterwards nitrogen gas; and, in a continued intense heat, the acid is completely expelled and decomposed, leaving behind pure potassa.

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1 Each Bengal ship of 800 tons generally brings home in a period of war about 5000 bags of nitre.

2 Nitre was unknown to the ancients; and Beckmann thinks that it was not discovered till the 13th century. The term *sal petrosum* is first mentioned in the work of Albertus Magnus "*De Mirabilibus Mundi,*" in a prescription of Marcus Græcus for making the Greek fire: but it is probable, as Beckmann conjectures, that this salt was known long before this period in India, where he believes gunpowder also was invented, and brought by the Saracens from Africa to Europe. —*History of Inventions,* vol. iv.

Nitre when mixed with inflammable substances detonates in a strong heat; and if charcoal be used, a pure carbonate of potassa remains behind. It is likewise decomposed by the sulphuric acid, alum, sulphate of magnesia, and the sulphates of zinc, copper, and iron, when aided by heat; and in the cold by baryta. According to the analysis of Berard, 100 parts of nitrate of potassa contain 51·36 nitric acid, and 48·64 potassa[1], or 1 eq. of potassa $=47{\cdot}15+1$ of nitric acid $=54{\cdot}15=101{\cdot}3$.

Nitrate of potassa sometimes contains hydrochlorate and sulphate of soda, and sulphate of potassa. The hydrochlorate is discovered by nitrate of silver, throwing down a precipitate, every 100 grains of which denote 42½ of hydrochlorate of soda. The sulphates are detected by nitrate of barytes.[2]

Medical properties and uses.—Nitrate of potassa is refrigerant, excitant, and diuretic; and, when externally applied in solution, it is cooling and detergent. If taken in repeated small doses, it increases the secretion of urine, in which, and in the alvine dejections, the salt may be detected, unchanged, by chymical tests. It is efficaciously given in active hæmorrhages, particularly hæmoptysis, in which it may be administered in doses of a drachm, without exciting griping or any action in the bowels. It is also useful in herpetic eruptions. Although diuretic, yet it is of little use in dropsies, and is contra-indicated in typhus and hectic fever: in the latter of which, as Dr. Percival has justly observed, it lowers the pulse at first, but afterwards raises it higher than before. A small portion of it, allowed to dissolve slowly in the mouth, often removes incipient inflammatory sore-throat; and thence its utility in gargles in that complaint.

It is most advantageously given dissolved in mucilaginous fluids, as almond emulsion, in moderate doses not exceeding grs. xv. frequently repeated: but the dose may be carried to ʒij. with safety. In larger doses it excites nausea, a lively sensation of cold at the epigastric region, and sometimes colic; and in very large doses, from ʒiv. to ℥j. for instance, which have sometimes been taken by mistake for sulphate of soda, it causes vomiting, hypercatharsis, bloody stools, convulsions, and sometimes death. Opium and aromatics are the best antidotes.

Officinal preparations.—*Acidum Nitricum*, L. E. D. *Potassæ Sulphas*, L. E. D. *Potassæ Bisulphas*, L. *Sulphas Potassæ cum Sulphure*, E. *Trochisci Nitratis Potassæ*, E.

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[1] *Ann. de Chim.* t. lxxi. p. 69.

[2] *Henry's Elements of Experimental Chymistry*, 7th ed. vol. ii. p. 464.

POTENTILLA. *Spec. Plant. Willd.* ii. 1112.

Cl. 12. *Ord.* 5. Icosandria Polygynia. *Nat. ord.* Rosaceæ.

G. 1001. *Calyx* three-cleft. *Petals* four. *Seeds* roundish, naked, affixed to a small juiceless receptacle.

Species 1. P. *erecta.*[1] Common Tormentil, or Septfoil (*officinalis*). *Smith, Flora Brit.* 552. *Eng. Bot. t.* 863. *Med. Bot.* 2d *edit.* 503. *t.* 181.

Officinal. TORMENTILLÆ RADIX, *Lond. Edin.* TORMENTILLA OFFICINALIS, *Dub.* Tormentil root.

Syn. Tormentil (*F.*), Törmentilwurzel (*G.*), Meerwortel (*Dutch*) Blodrot (*Swed.*), Kurzeziele (*Pol.*), Tormentilla (*I., S., Port.*), Sabiasnoi koren (*Russ.*).

This is a very common, indigenous, perennial plant, growing in dry pastures and on heaths; flowering in June and July. The root is woody: the stems are erect, branched, diffuse or procumbent, round and leafy. The leaves are nearly sessile, ternate, lanceolate, serrated, and hairy, accompanied by deeply incised stipules. The flowers are on long, capillary, opposite, solitary, one-flowered peduncles; the calyx consists of ovate, hairy, alternately larger and smaller segments, the latter of which are exterior; the petals have short claws, are obcordate, and of a golden-yellow colour: the seeds are few and wrinkled.

Qualities.—The root has a very slightly aromatic odour, and an austere styptic taste. It is knotty: externally blackish, and internally reddish. To boiling water it yields its active matter, which appears to be chiefly tannin, as the infusion is copiously precipitated by solution of isinglass, and strikes a deep black with sulphate of iron. Except galls and catechu, it contains more tannin than any other vegetable.

Medical properties and uses.—Potentil root is a powerful astringent. It has been employed with success in intermittents, but more efficaciously in diarrhœas; particularly those attendant on phthisis, as it produces its astringent effects without increasing the general excitement. As a local remedy it may be advantageously used in the form of gargle and lotion in ulcerations of the tongue and mouth, against spongy gums, and as an application to fetid, ill-conditioned sores; but it is seldom used. It may be given in substance, or in the form of decoction. The dose of the powdered root is from ʒ ss. to ʒ j.

PRUNUS. *Spec. Plant. Willd.* ii. 984.

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. ord.* Amygdalaceæ.

G. 982. *Calyx* five-parted, inferior. *Petals* five. *Nut of the drupe* with prominent sutures.

Species 10. P. *Lauro-Cerasus.* Cherry Laurel. *Blackw. t.* 512. *Med. Bot.* 3d *edit.* 3. *p.* 513. *t.* 186.

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[1] Πενταφυλλον Dioscoridis.

Species 29. P. *domestica.*[1] Common Plum Tree. *Med. Bot.* 3d *edit.* 520. *t.* 187.

1. PRUNUS LAURO-CERASUS.

Officinal. PRUNUS LAURO-CERASUS, FOLIA, *Dub.* Cherry Laurel, the leaves.

The cherry laurel is a native of Trebizond; but has been naturalized to this climate, and attains a considerable size. It is an evergreen, shedding the leaves early in summer, at which time they are pushed off by the new shoots. The leaves are supported on short sulcated petioles: they are coriaceous, from four to seven inches in length, about two broad, acuminate, sparsely dentated, smooth, shining on the upper disc, pale green and dull on the under; inodorous unless bruised, when they exhale a strong smell of bitter almonds.

Qualities.—The recent leaves have a slightly astringent, intensely bitter taste, which they lose by drying. They yield both odour and taste to water in distillation; and an oil, resembling that of bitter almonds, and containing hydrocyanic acid, is procured in small quantity, the greater part of it remaining in combination with the water.

Medical properties and uses.—The recent leaves are sedative: they are employed as an application to cancerous sores; bruised, and made into a poultice with crumb of bread. Dr. Cheston made an infusion with four ounces of the leaves in two pounds of boiling water, to which he added four ounces of honey: this mixture he spread on linen, and applied to cancerous ulcers. For the properties and uses of the distilled water, see Part III.

Officinal preparation.—*Aqua Lauro Cerasi*, D.

2. PRUNUS DOMESTICA.

Officinal. PRUNA, *Lond.* PRUNI DOMESTICÆ FRUCTUS, *Edin.* FRUCTUS SICCATUS, *Dub.* Prunes.

Syn. Prunes (*F.*), Pflaumen (*G.*), Priumen (*Dutch*), Pruno domestico, or Prugna (*I.*), Ciruelas pasas (*S.*), Sliwnik (*Russ.*), Erik (*Turk.*).

The tree which yields this fruit is a native of Asia and Greece, although it is now completely naturalized to Europe, and to our climate, growing wild in coppices, and flowering in April and May. It rises about fifteen feet in height, with a moderately spreading head. The leaves are pale green, standing on short petioles, which have two glands near the base of the leaf: they are serrated, smooth, and, when young, convoluted and pubescent underneath: the flowers are large,

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[1] Κυκκυμηλεα Dioscoridis, Barkuk (*Arab.*), Muei Xu (*Chin.*).

on short solitary peduncles, with an erect calyx, and obovate white petals: the fruit is a superior, berried, oval drupe, swelling a little more on one side, and three-grooved; of a bluish violet colour on the outside, internally consisting of a yellow, fleshy, sweet pulp; and containing a smooth, almond-shaped nut.[1]

The dried fruit, which only is officinal, is imported from the Continent in chests; and that which is brought from Bordeaux is regarded as the best. The recent fruit, when perfectly ripe, is pleasant to the palate, and sufficiently wholesome; but when eaten too freely it occasions flatulence, griping, and diarrhœa, more readily than any other fruit.

Qualities.—Prunes are nearly inodorous, but have an agreeable, sweet, subacid taste. They contain chiefly mucus, saccharine matter, and malic acid.

Medical properties and uses.—Dried plums or prunes are gently laxative, and form a pleasant addition to purgative electuaries and decoctions. Simply boiled, they may be beneficially given to children who are habitually costive; and in fevers.

Officinal preparation.—*Confectio Sennæ*, L. E. D.

PTEROCARPUS.[2] *Spec. Plant. Willd.* iii. 904.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.

G. 1318. *Calyx* five-toothed. *Legume* falcated, leafy, varicose, surrounded with a wing, not gaping. *Seeds* solitary.

Sp. 6. P. *Santalinus.* Red Saunders tree, *Med. Bot. 3d edit.* 430. *t.* 156. *Willdenow, Spec. Plant.* iii. 906.

Sp. nova, P. *Erinaceus. Encycl. Method. Lam. Illust. Gen.* tab. 602. fig. 4.

1. PTEROCARPUS SANTALINUS.

Officinal. PTEROCARPUS, *Lond.* PTEROCARPI SANTALINI LIGNUM, *Edin.* SANTALUM RUBRUM, LIGNUM, *Dub.* Red Saunders wood.

Syn. Santale rouge (*F.*), Rothes Sandalholz (*G.*), Root Zandelhout (*Dutch*), Sandalo Roso (*I.*), Sandolo rubio (*S.*), Ract Chandan (*H.*), Segapoo Shandanum (*Tam.*), Sundul Ashmer (*Arab.*), Sundul Soork (*Pers.*), Ruct Handoon (*Cyng.*), Ruckta Chunduna (*Beng.*), Racta Chandana (*San.*), Hoam pe mo (*Chin.*).

This tree is a native of the mountains of India, particularly the rocky parts in the Onore district[3], and of Ceylon. It is a

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1 Martyn, in his edition of Miller's Gardener's Dictionary, enumerates sixty varieties of the plum. The French prunes are the same as those which were formerly brought from Damascus.

2 From πτερον, *a wing*, and καρπος, *fruit.*

3 When transplanted to low situations and a richer soil, the tree degenerates, and is, in all respects, less esteemed.—*Forbes's Oriental Mem.* 4to, vol. i. p. 808.

lofty tree, with alternate branches, and a bark resembling that of the common alder. The leaves are petiolate and ternate, each simple leaf being ovate, blunt, entire, retuse, veined, smooth on the upper surface, and hoary beneath; the flowers are in axillary spikes, without bractes: the calyx is brown: the corolla papilionaceous, consisting of an erect, obcordate *vexillum*, turned back at the edges, denticulate, curled, and waved, and of a yellow colour, with red veins; yellow, spreading, denticulate *wings*, waved at the edges; and an oblong *keel* a little inflated and curled at the tip: the filaments are yellow, and support globular, white anthers: the germen is oblong, compressed, hirsute, with a curved style, and an obtuse stigma: the pod is pedicelled, compressed, smooth, keeled along the lower edge, and contains one round compressed seed.

This tree, which yields the true officinal red saunders, was first detected by Kœnig in India. The wood is brought home in billets, which are very heavy, and sink in water.

Qualities.—Red saunders wood has an aromatic odour, and is nearly insipid. It is extremely hard, of a fine grain, and a bright garnet-red colour, which deepens on exposure to the air. It yields its colouring matter, which appears to be of a resinous nature, to ether and alcohol, but not to water.[1] The alcoholic tincture is red, but becomes yellow when largely diluted with water. Volatile oil of lavender also extracts its colouring matter; yet it is scarcely affected by oil of turpentine, which acquires a pale yellow tinge only, even when assisted by heat. Neumann first noticed this fact[2]; and it has been suggested that the camphor contained in the oil of lavender may give it the above property; but camphoreted oil of turpentine has no more effect than the simple oil. I find that by shaking oil of turpentine, which has been digested over red saunders, with a little alcohol, the slight tinge of colour it received is instantly taken up by the spirit, and the oil settles as a colourless substratum.

Red saunders has no medicinal properties, and is used only as a colouring matter.

2. PTEROCARPUS ERINACEUS.

Officinal. KINO, *Lond. Dub.*

Syn. Gomme de Kino (*F.*), Kinoharz (*G.*), Chino (*I.*), Toomble hōan (*Tam.*).

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[1] Yet Willdenow, who received the description of the tree and its wood from Kœnig, says, "attritu humido pulchre rubrum tingens." The yielding no colouring matter to water affords an easy mode of distinguishing red saunders from Brazil wood, which was first pointed out by Dr. Lewis.—*Thomson's Chym.* v. 208.

[2] *Neumann's Chym.* 337.

Although the Edinburgh College has inserted kino as the inspissated juice of the *Eucalyptus resinifera,* in the list of materia medica of its Pharmacopœia, and the Dublin College has considered it as the product of the *Butea frondosa,* yet we believe that the plant which yields the best kino is an African tree; and from a specimen sent home by Mungo Park, which is in the possession of Sir Joseph Banks, it is a pterocarpus, and that species which is described under the specific name *Erinaceæ* in the Encyclopédie Méthodique. It is a native of Senegal; and is distinguished from the other species of the genus by long yellow spines on the fruit. The leaves are pinnated; composed of obtuse oval leaflets, larger at the base, petiolate, entire, thin, and smooth above; pubescent, and of a reddish hue below, where they are marked with fine, parallel, alternate, oblique ribs or nerves, a little arched. The flowers are on peduncles. The calyx is bell-shaped, truncated, slightly toothed, and pubescent. The fruit is a compressed, orbicular, pubescent pod, bulging on both sides in the middle, where it is covered with white hairs and long, numerous, yellow skins. It contains one seed only. This tree yields the real African kino, now seldom or never found in the market. Kino, such as is brought from Botany Bay, is the production of the Eucalyptus *resinifera,* the brown gum tree of that country.[1] It belongs to the natural order Myrtaceæ; but it differs in several of its qualities from the kino described by Dr. Fothergill, who introduced this remedy into practice.[2] We are informed, that little of it has been brought to this country since 1802. Another sort is said to come from Jamaica; and it is stated by Dr. Duncan, junior, to be the extract of the *Cocoloba uvifera,* or sea-side grape[3]; while Dr. Murray says, "he has been informed that it is the extract of the wood of mahogany."[4] The Dublin College

[1] This plant belongs to the first order of the twelfth class of the Linnæan system. It is a lofty tree, exceeding an English oak in size; and bearing yellowish flowers in umbellated clusters. The calyx is hemispherical, perfectly entire in the margin, and afterwards becomes the capsule; on the top, just within the margin, stands a pointed calyptra, of the same colour as the calyx, and as long. This calyptra, which is the essential mark of the genus, is analogous to the corolla in other plants, but neither splits nor divides; on removing it, a great number of red stamens appear, standing in a conical mass, very resinous, aromatic, and bearing small red anthers. In the centre is a simple style terminated by a blunt stigma, and rising from a transversely cut trilocular germen. The quantity of juice obtained from incisions made into the wood of the trunk amounts, sometimes, to sixty gallons from one tree. See *White's Voyage,* 231.

[2] *Medical Obs. and Inquiries by a Society of Physicians in London,* i. 238. 243.

[3] *Edinburgh New Dispensatory,* 5th edit. 292.

[4] *System of Mat. Med. and Pharmacy,* ii. 304.

indicated the *Butea frondosa* on the authority of Dr. Roxburgh: but the red juice which this plant yields has been examined by Dr. Duncan, and found to differ very considerably from kino, although it may be used as a substitute for it. The kino now chiefly found in the shops comes from India, and is the extract of the *Nauclea Gambir*, a plant belonging to the natural order Cinchonaceæ. The branches and twigs are bruised and boiled in water. The decoction is then evaporated until it acquires the consistence of an extract, which is kino. It is imported in chests containing from one to two cwt., and on the inside of the lid of each chest is a paper, inscribed with the name of John Brown, the month and year of its exportation; and stating that it is the produce of Amboyna.

Qualities.—1. *Kino* which was given to me as a specimen of true *African kino* is inodorous, and insipid when first taken into the mouth; but after some time it imparts a slight degree of roughness, with a scarcely perceptible sweetness, to the palate; feels gritty between the teeth when chewed, and does not colour the saliva. It is in very small, irregularly shaped, shining, deep ruby-brown coloured fragments, and intermixed with small twigs and minute bits of wood, which are white in the inside. It is pulverulent, affording a dark chocolate or reddish brown powder. Water at 60° dissolves the larger moiety of it, and gives a brick red, rather turbid infusion, which does not become clear after standing twenty-four hours. Alcohol dissolves nearly two thirds of it, the tincture having a very deep brown colour: what remains undissolved is nearly colourless. Ether takes up about one third; and the tincture, which is of a beautiful claret-colour, when evaporated on the surface of water, leaves a pellicle of brittle brown resin; while a sweetish, red-coloured extractive matter remains dissolved in the water.

2. *Botany Bay kino* is in large, irregular dark-brown masses, or in fragments covered with a reddish brown powder: it is inodorous; tastes bitterish, and more austere than the African; it is equally brittle, breaking with a glassy fracture, and affording a brown-coloured powder; but it is not uniform in appearance, some of the fragments being of a lighter hue. Water at 60° dissolves more than of the former variety, and the infusion is brown and transparent. Alcohol dissolves rather more than two thirds of its weight, but the tincture is not so deep-coloured as that of the former variety. Ether takes up one twentieth; a pale brownish straw-colour only is imparted to it; and when evaporated on water, the resinous pellicle is scarcely perceptible, and very little extractive is deposited.

3. The *kino* said to have been brought from Jamaica, but of which none is now to be procured, is in bitterness and roughness nearly equal to the last variety, but these qualities are accompanied with a slight degree of acidity. It is in brittle masses, sometimes retaining the shape of the vessel in which it was dried, of an almost black colour, having a shining, resinous fracture, in which appear small air bubbles. The powder is of a reddish brown colour. With alcohol and ether it affords results very similar to those of the first variety. Water dissolves a greater portion of it than of the other two kinds, and forms an infusion intermediate in colour and transparency; approaching in colour to the first, and in clearness to the second variety.

4. *East India* or *Amboyna kino* is inodorous, very rough, and slightly bitter when first taken into the mouth; but it afterwards impresses a degree of sweetness on the palate. It is in small, uniform, deep brown, shining, brittle fragments, which appear like portions of a dried extract broken down, being perfectly uniform in their appearance. It is easily pulverized, affording a powder of a lighter brown colour than the fragments. Water dissolves two thirds of it, forming a deep brown clear solution; whilst the portion that remains undissolved is long suspended, if mixed with a fresh portion of water.[1] Alcohol dissolves the greater part of this variety, forming a deep claret-coloured tincture, which is not rendered turbid on the addition of water. Ether takes up a portion of it, and forms a yellowish red tincture, which when evaporated on water, leaves no resinous pellicle.

All the varieties, according to Vauquelin, contain a species of tannin, but no gallic acid. They dissolve in solutions of pure potassa and of ammonia, and no precipitation takes place on the addition of water. Some chymical change, however, is effected; and the astringent property of the kino is completely destroyed,—a fact which ought to be kept in remembrance in prescribing this remedy.

The tables in page 600 show the result of some experiments with several chymical re-agents on the watery infusions of these three varieties of kino.[2] They point out the distinctive features of the four varieties I have enumer-

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[1] In India, an aqueous solution of kino is employed for dyeing the colour termed *Nankeen* on cotton and other clothes.—*Virey, Bullet. de Pharm.* tom. iv. p. 364.

[2] The specimens subjected to these experiments, I have reason to think, were perfectly genuine. The African kino was brought home twenty years ago.

ated; but they have no pretensions towards advancing the knowledge of the chymical properties of kino.

From these experiments there appears to be a considerable difference between three of the four varieties of kino known in commerce, but the first and the fourth appear to be nearly the same. The most remarkable differences are, the small portion of resin which that from Botany Bay and Amboyna contains; the blue colour of the precipitate of the Jamaica variety by the persulphate of iron; and the effect of the solution of potassa in rendering that from Africa transparent, while it precipitates the second and the third varieties. The predominant principles, in all the varieties, are tannin and extractive matter; and the portion of resin, in the first and third varieties, enables ether to take up their colouring matter and some extractive, whilst the second variety is scarcely affected by it. Dr. Duncan[1] and Vauquelin[2] observed, that although heat increases the solvent power of water over kino, yet that a substance insoluble either in water or in alcohol always remains. Vauquelin also found that the solutions form a precipitate with tartarized antimony and the salts of iron.

The best menstruum is diluted alcohol.

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[1] *Nicholson's Journal*, vi. 234.

[2] *Annales de Chimie*, xlvi. 321. Vauquelin states generally, that the salts of iron precipitate kino green; but Dr. Duncan justly observes, that by the red sulphate it is precipitated black: the sulphate only precipitates it green.

TABLE I. Precipitates formed in the Aqueous Solution of Kino, by Gelatine and Solutions of some Metallic Salts.

Variety of Kino.	Solution of Isinglass.	Solution of Persulphate of Iron.	Solution of Nitrate of Silver.	Solution of Bichloride of Mercury.	Solution of Acetate of Lead.
1st.	copious, slowly formed, of a brick red colour.	copious, quickly formed, of a dirty olive black.	copious, slowly formed, of a deep reddish brown.	not very copious, slowly formed, reddish.	copious, flocculent, quickly formed, brown.
2d.	copious, almost instantly formed, of a pink colour.	very slowly formed, of a deep brownish black.	copious, quickly formed, of an olive black.	copious, quickly formed, yellowish pink.	copious, flocculent, quickly formed, lilac.
3d.	scanty, slowly formed, of a pinkish colour.	copious, quickly formed, of a blue black.	copious, quickly formed, reddish brown.	scarcely altered.	copious, flocculent, quickly formed, brownish lilac.
4th.	the same as No. 1.	copious, and dirty olive black.	copious, and quickly formed, reddish brown.	quickly formed, reddish.	the same as No. 1.

TABLE II. Precipitates formed by Solution of Potassa and Acids.

Variety of Kino.	Potassa.	Sulphuric Acid.	Nitric Acid.	Hydrochloric Acid.
1st.	none, but renders it clear, and of a deep brown colour.	copious, pale brown.	scanty, slowly formed, reddish yellow.	scanty, slowly formed, yellowish brown.
2d.	flocculent, purplish.	copious, deeper brown.	copious, quickly formed, yellowish brown.	scanty, more quickly formed, pale red brown.
3d.	flocculent, brownish purple.	very copious, very deep brown.	copious, brown.	scanty, quickly formed, a beautiful red.
4th.	the same as No. 1.	copious, pale brown.	copious, quickly formed, brown.	quickly formed, yellowish brown.

Medical properties and uses.—Kino is a powerful astringent. Like catechu, it is employed in obstinate chronic diarrhœas, lientery, uterine and intestinal hæmorrhages, and fluor albus; but, as it is supposed to be less certain in its qualities than catechu, it is less used. It has also been used for the cure of intermittents; and it is said to increase the power of cinchona. Externally, it has been applied as a styptic, and to give tone to and diminish the ichorous discharge of flabby ill-conditioned ulcers. The alkalies, as already stated, destroy its astringent qualities.

It may be exhibited internally in substance, or in the form of watery solution, or of tincture. The dose in substance is from grs. x. to ʒss.; that of the solution of ℥ jss., and of the tincture f ʒ j. In ordering the solution or the tincture, it is necessary to recollect that solutions of isinglass, sulphate of iron, nitrate of silver, bichloride of mercury, acetate of lead, tartarized antimony, the alkalies, and the strong acids, are incompatible in prescriptions with kino.

Officinal preparations.—*Pulvis Kino comp.*, L. D. *Tinctura Kino*, L. E. D. *Electuarium Catechu comp.*, D. E.

PULEGIUM. Vide *Mentha Pulegium.*

PUNICA. *Spec. Plant. Willd.* ii. 981.

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. ord.* Myrtaceæ.

G. 930. *Calyx* five-cleft, superior. *Petals* five. *Pome* many-celled, many-seeded.

Sp. 1. P. *Granatum.*[1] Pomegranate tree. *Med. Bot. 3d edit.* 531. *t.* 190.

Officinal. GRANATUM, *Lond.* BACCÆ TUNICA EXTERIOR. RADICIS CORTEX. FLORES, *Dub.* Pomegranate bark, and flowers.

Syn. Le Grenadier (*F.*), Granatass felschale (*G.*), Granaat-boom (*Dutch*), Drzewo Granatow (*Pol.*), Pomo Granato (*I.*), Romã (*Port.*), Granado (*S.*), Granatnik (*Russ.*), Rānā (*Arab.*), Anàr (*H.*), Darim (*San.*), Daelfima (*Sang.*), Magilam palam (*Tam.*), Dalema (*Malay*), Delunghedie (*Cyng.*), Daleemb (*Mah.*).

The pomegranate tree is a native of the south of Europe, Asia, and Barbary: but in the West Indies, where it was introduced from Europe, the fruit is larger and better flavoured than in its native climates.[2] In its proper soil, which is a cretaceous one, it rises twenty feet in height, sending out branches from the whole length of the stem, some of which bear thorns. The leaves are opposite, about three inches long, half an inch broad in the middle, pointed at each end, entire, and of a light, lucid green colour: the flowers, which

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[1] 'Poa Dioscoridis, *Han Xe lieu* (Chin.).

[2] It stands our winters, and even bears fruit, which, however, has not the proper flavour.

are terminal and sessile, are three or four together: the calyx is thick, fleshy, of a fine red colour, and divided into five-pointed segments: the petals are wrinkled, and of a scarlet colour; the fruit, which is cellular, according to Gærtner[1], is a pulpy many-seeded berry, the size of an orange, crowned with the calyx, which is sharply toothed, globular, and covered with a thick, coriaceous rind.

The red succulent pulp, which is not officinal, is pleasantly acid[2], resembling that of the orange: it is cooling and useful for quenching thirst, and gently aperient; and was made into wine by the ancients.

Qualities.—The *flowers*, which are named *Balaustines*, are inodorous, and taste bitterish and astringent. The *bark of the fruit*, and of the root, have the same sensible qualities. Water extracts the virtues of both; and the solutions strike a deep bluish black with sulphate of iron. According to Reuss, 216 parts yield 60 of tannin, 74 of mucus, 2 of resin, 22 of oxidized tannin, and 45 of extractive.

Medical properties and uses.—Both the parts we have described are astringent. They are given in the form of decoction in chronic and colliquative diarrhœa, and the protracted stage of dysentery. They are supposed to prove beneficial also in checking the violent sweating which accompanies hectic fever; but the chief use of the decoction is as an injection in leucorrhœa, or as a gargle in sore throats, after the local inflammation is moderated. Dr. Buchanan has stated that the bark of the *root* of the plant has been long used by the natives of Hindostan, and, according to M. Deslandz, by the negroes of St. Domingo, for expelling tapeworm; and its utility for this purpose has been fully confirmed by the experiments of Mr. Breton[3], Dr. Gomes of Lisbon, and Dr. Wolff of Bonn.[4] Mr. Breton gave it in the form of powder, in doses of ℈j., and of decoction, prepared by boiling ℥ ij. of the bark in Ojss. of water, and reduced to f ℥ ix., of which, when cold, a glassful was given every half hour, until four doses were taken. The action of the remedy is generally accompanied with nausea. The worm was generally voided alive, a few minutes after the last dose. Celsus says it was used by the ancients for a similar purpose.[5] The bark and

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[1] *De Fructibus*, i. 183. *t.* 38. *f.* 1.

[2] Russel says there are three varieties of this fruit in Syria; one sweet, another very acid, and a third partaking of the qualities of both blended.—*Nat. Hist. of Aleppo*, ii. 85.

[3] *Vide Medico-Chirurg. Trans.* vol. ii. p. 301.

[4] *Hufeland's Journal*, Aug. 1825.

[5] Vide *Celsus de Medicinâ*, lib. iv. § xvii.

flowers are given in the form of powder, in doses of a scruple increased to a drachm; or of a decoction made with ʒiv. of the bark and f ℥vi. of water, f ʒvj. may be given for a dose every three hours.

QUASSIA. *Spec. Plant. Willd.* ii. 567.

Cl. 10. *Ord.* 10. Decandria Monogynia. *Nat. ord.* Simarubiaceæ.

G. 849. *Flowers* hermaph. *Calyx* short, with five deeply-divided segments. *Petals* five.

Species 3. Q. *excelsa. Trans. Roy. Soc. Edin.* iii. 205—210. *t.* 6.

Officinal. QUASSIA, L. E. D. The wood of Quassia.

Syn. Bois du Quassie (*F.*), Quassienholz (*G.*), Legno della Quassia (*I.*), Leno de Quassia (*S.*), Pao de Quassia (*Port.*).

This species of quassia grows in the natural woods of Surinam, Jamaica, and the Caribbean islands, where it is called the bitter ash; and flowers in October and November. It is a beautiful tall tree, rising sometimes one hundred feet in height, with a straight, smooth, tapering trunk, often ten feet in circumference near the base; and covered with a smooth grey bark. The leaves are pinnate, consisting of from five to eight opposite pairs of leaflets, with a terminal leaflet; they are oblong and pointed; the ribs reddish; and the young leaves are covered with a fine brown down. The flowers are in clusters from the lower part of the last shoot before the leaves: they are small, of a yellowish green colour, with a very small calyx: the male flowers are nearly similar to the hermaphrodite, except that they have the rudiments only of a style. The fruit is a small black drupe, round, the size of a pea, and attached in threes, sideways, to a round fleshy receptacle. It is ripe in December, and is not bitter.[1] The wood is sent to this country in billets, and is reduced to chips, or rasped, by the druggists.[2]

Qualities.—Quassia wood is inodorous, and has an intensely bitter taste; it is of a pale yellow colour. Alcohol and water take up its bitterness, and, when evaporated to dryness, leave a brownish yellow, somewhat transparent, brittle extract, which has been regarded as a vegetable constituent *sui generis*, and named *quassina*, or the bitter principle.[3] I am inclined to believe that this principle, although not itself of a resinous nature, is connected with resin, as ether takes it

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[1] *Edin. Phil. Trans.* iii. 207.

[2] It is asserted, that of late years the brewers have used quassia wood instead of hops. Beer made with it certainly does not keep, but soon becomes muddy, flat, has a mawkish taste, and runs into the acetous fermentation. Mr. Brande says, an infusion of quassia sweetened with brown sugar is an effectual poison for flies. —*Manuel*, p. 46.

[3] *Thomson's Chymistry*, 4th edit. v. 32.

up, and the tincture, when evaporated on water, which becomes intensely bitter, leaves an insoluble pellicle that has the character of a resin. The infusion is rendered muddy by nitrate of silver, a soft, flaky, yellow precipitate being formed; and acetate of lead occasions a copious white precipitate: thence, these salts are incompatible in formulæ with it; but it is not affected by tartarized antimony, nor sulphate of iron, nor gelatine.

Medical properties and uses.—Quassia is tonic. It has been found efficacious in dyspepsia and nervous irritability, intermittent and bilious remittent fevers, chlorosis, diarrhœa; and, when combined with cretaceous powder and ginger, in atonic gout. It does not sensibly quicken the circulation, nor augment the animal heat. We have given it, combined with nitric acid, with evident benefit in typhus, gout, and also in fluor albus. Infusion is the best form of administering quassia; the raspings, for it cannot be properly pulverized, being too bulky: but it may, nevertheless, be given in substance in doses of from grs. x. to ʒ j. three or four times a day.

Officinal preparations.—*Infusum Quassiæ*, L. D. *Tinctura Quassiæ excelsæ*, E. D.

QUERCUS. *Spec. Plant. Willd.* iv. 423.

Cl. 21. *Ord.* 6. Monœcia Polyandria. *Nat. ord.* Cupuliferæ.

G. 1692. *Male.* *Calyx* commonly five-cleft. *Corolla* none. *Stamens* five to ten.

——— *Female.* *Calyx* one-leafed, entire, rough. *Corolla* none. *Styles* two to five. *Nut* coriaceous, surrounded at the base by the persistent calyx.

** *With toothed leaves.*

Species 33. Q. *infectoria.* Dyer's Oak. *Olivier's Travels* (*translation*), i. 41. *t.* 14, 15. *Med. Bot.* v. *p.* 4. *t.* 2.

***** *With sinuated leaves and beardless lobes.*

Species 65. Q. *pedunculata.* Common White Oak. *Med. Bot.* *3d edit.* 23. *t.* 10. *Michaux, North American Sylva,* vol. i. pl. 2, (*Q. Robur.*) *Smith, Flora Brit.* 1026. *Michaux,* b. c.

1. QUERCUS INFECTORIA. (*Quercus Cerris,* Edin.)

Officinal. GALLÆ, *Lond. Edin.* GALLÆ, *Dub.* The Gall.

Syn. Noix de Galles (*F.*), Galläpfel (*G.*), Galnoot (*Dutch*), Galdaebel (*Dan.*), Gallaple (*Swed.*), Galle (*I.*), Agalle de Levante (*S.*), Galha (*Port.*), Maju P'hal (*H.* & *San.*), Māchàkāi (*Tam.*), Afis (*Arab.*), Mazu (*Pers.*), Māphul (*Duk.*).

The Dublin College has not named any particular species of oak as furnishing the gall; the Edinburgh College has particularized the *cerris:* but the London has correctly stated it to be Q. *infectoria.* It is well known that most of the other species of Quercus produce galls, yet the species from which the galls of commerce are obtained has been distinctly pointed out by Olivier from his personal knowledge; the species above named is the real tree; and, as we know no reason for doubting his veracity, we shall copy his description of it.

The *quercus infectoria* is scattered throughout all Asia Minor, from the Bosphorus as far as Syria, and from the coasts of the Archipelago as far as the frontiers of Persia. It has a crooked stem, seldom exceeds six feet in height, and more frequently assumes the character of a shrub than that of a tree. The leaves, which are deciduous in autumn, are on short petioles, smooth, of a bright green colour on both sides, and obtusely toothed: the acorn is elongated, smooth, two or three times longer than the cup, which is sessile, in a slight degree downy and scaly: the gall comes at the shoots of the young boughs, and acquires from four to twelve lines in diameter; the insect which produces it is the *cynips quercusfolii* of Linnæus (*diplolepsis gallæ tinctoriæ* of Geoffroy), a small hymenopterous insect or fly, with a fawn-coloured body, dark antennæ, and the upper part of the abdomen of a shining brown. The insect punctures the tender shoot with its sting, which is spiral, and deposits its egg in the puncture. This occasions a morbid irritation in the vessels of the part; the gall rises in a few hours, and attains its full size in a day or two, before the larva is hatched: the egg grows with the gall: and it is by the irritation which it keeps up,—not, as has been supposed, by the maggot feeding on the juices of the plant,—that the morbid excitement is maintained in the vessels of the part, sufficient for the production of this kind of vegetable wen.

Galls are gathered before the larva within them changes to a fly, and eats its way out; for, when this has happened, the galls become lighter, and contain less of the astringent principle. The first galls that are picked are named *yerli* by the natives, and are known in trade by the terms *black* or *blue galls*, and *green galls*. Those which are gathered afterwards, from the circumstance of their being pierced, are of an inferior quality, and are denominated *white galls*. The best galls are those of Aleppo, Smyrna, Magnesia, Karahisser, Diarbekir, and the interior of Natolia. Those which are brought to this country come chiefly from Aleppo, in bags and cases.

Qualities.—Galls are inodorous, and have a bitter, very astringent taste. They are nearly round, of different magnitudes, from the size of a pea to that of a hazel nut; smooth on the surface, yet studded with tuberosities; and, when good, of a blackish blue or deep olive colour: a white or a red hue indicates an inferior quality.[1] They are heavy, brittle, break with a flinty fracture, and display a compact, striated texture. The whole of their soluble matter is taken up by about forty times their weight of boiling water, and what remains is tasteless. The decoction, on cooling, deposits a pale yellow precipitate, which is a tannate of starch. Alcohol, digested on powdered galls, takes up seven parts in ten, and ether five parts. The watery infusion reddens tincture of litmus, and forms precipitates with solution of isinglass, the infusions of cinchona bark, opium, cusparia bark, and columba root; but not with infusion of quassia, nor of saffron. Sulphuric acid throws down a yellowish, curdy; hydrochloric acid, a flaky, whitish precipitate; while nitric acid changes the colour only of the infusion, first to a deep orange, and afterwards to a paler orange yellow. The solution of ammonia occasions no precipitate, but deepens the colour: the carbonate, however, produces a precipitate. Carbonate of potassa throws down a yellowish, flaky precipitate, and extricates ammonia; and lime-water a copious deep green precipitate. Precipitates also are formed with solutions of quina, cinchonia, the salts of morphia, emetina, and of the following metallic salts: acetate and diacetate of lead, greyish; tartarized antimony, yellowish; sulphate of copper, brown; sulphate of iron, bluish-black; sulphate of zinc, reddish-black, but very slowly formed; nitrate of silver, deep olive; and nitrate of mercury, bright yellow. The bichloride of mercury renders the infusion milky and opaque, but no precipitate is formed. The alcoholic tincture reddens litmus, and is affected by the same re-agents as the watery infusion. The ethereal tincture, when evaporated on water, leaves on the side of the glass an opaque pellicle, and on the surface of the water small drops of an oily, resinous-like matter, while the substratum of water becomes charged with tannin and gallic acid. The pellicle and resinous-like matter is plastic, tenacious, resembling birdlime treated with ether; and when subjected to heat, melts, swells, burns, and leaves a dense black charcoal. These experiments show results which cannot altogether depend on the presence of tannin, gallic acid, extractive, or mucilage, which are supposed to be the constituents of galls. In Sir H. Davy's ex-

[1] This is the character of the galls from which the insect has escaped, and which are also of a brighter colour. Another species of gall, produced by another species of the insect, is also, Olivier says, found on the same oak. It is spongy, very light, of a brown red colour, covered with a resinous coat, and furnished with a circular row of tubercles placed nearly towards the most protuberant part. Their astringency is very inferior, and they are used only to adulterate the better sort.

periments 500 grains of Aleppo galls yielded to pure water, by lixiviation, 185 grains of solid matter; of which 130 were tannin, 31 gallic acid and extractive, 12 mucilage and matter rendered insoluble by the evaporation, and 12 saline and earthy matter. From different experiments, the proportion of extractive, however, if any, is very small: none appears in the evaporation of the ethereal tincture; and Dr. Bostock's experiments render the existence of mucilage very doubtful. From the experiments of Professor Branchi, it appears that galls also yield, by distillation with water, a concrete, volatile oil[1]: and M. Braconnot has discovered in them a new acid, which he has rather affectedly termed *ellagic*, from the word *galle* reversed![2] It is an insipid, inodorous, white powder, with a slight tinge of red, and insoluble in boiling water. When mixed with nitric acid, and very gently heated, the mixture acquires a reddish tint, gradually passing to a deep-blood red. Hence we may conclude, that the constituents of galls, besides tannin and gallic acid, are the above oil and ellagic acid. When powdered galls in a long filter are acted on by unrectified ether, and the percolated fluid evaporated and reacted upon by alcohol, pure tannin is obtained.

Medical properties and uses.—Galls are the most powerful of the vegetable astringents. They are seldom used as an internal remedy, although, in combination with bitters or aromatics, they have been given in obstinate diarrhœas, passive intestinal hæmorrhages and intermittents. They are frequently ordered in the form of gargles and injections; and an ointment formed of galls in fine powder, with eight parts of simple ointment and a small proportion of powdered opium, is a useful application to blind piles. A strong decoction applied to warts on the penis destroys them: this use of galls was proposed by M. Alcock.[3] For internal exhibition, the dose of galls is from grs. x. to ℈ j., which may be given twice or thrice a day.

Officinal preparations.—*Tinctura Gallarum*, E. D. *Unguentum Gallæ comp.*, L. E. D.

2. QUERCUS PEDUNCULATA.[4] Q. ROBUR.

Officinal. QUERCUS, *Lond.* QUERCUS ROBORIS CORTEX, *Edin. Dub.* Oak bark.

Syn. Ecorce de la Chêne commune (*F.*), Eichenrinde (*G.*), Corteccia della Quercia (*I.*).

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[1] *Phil. Mag.* vol. ix. p. 401. [2] *Ann. de Chim. et Phys.* ix. p. 187.

[3] Misy quoque et Galla, si puribus portionibus misceantur, corpus consumunt. *Celsus.* l. v. c. xxii.

[4] Δρυς Græcorum, *Eiche* (G.), *Eik* (Dutch), *Eeg* (Dan.), *Ek* (Swed.), *Darach* (Galic.), *Le Chêne* (F.), *Quercia* (I.), *Roble* (S. Port.), *Dub* (Russ.), *Mesche* (Turk.), *Baalut* (Arab.), *Tamma* (Finnl.), *Pelut* (Pers.).

This species of oak is indigenous; but it is found also all over Europe, in the north of Asia, and the northern extremity of Africa. It is a well-known beautiful tree, often rising to the height of 90 or 100 feet, and attaining a great degree of thickness in the trunk, which is covered with a rough, brown bark. The leaves are alternate, supported on short petioles, ovate-oblong, deeply sinuated, forming obtuse lobes; deep green, smooth, and shining on the upper surface; paler, and nearly glaucous underneath. The flowers are in axillary catkins: the male lax, pendulous, many-flowered, and yellow; the female longer, peduncled, and only three-flowered. The calyx of the male flower is membranous, bell-shaped, often five-cleft; while that of the female is coriaceous, scaly, downy, and becoming hemispherical, entire, and woody. The stamens are ten, longer than the calyx. The germen is ovate, crowned with a short cylindrical style and three stigmas. The fruit is an elliptical, coriaceous, smooth nut, fixed in the calyx as in a shallow cup, but at length dropping from it. The peduncles of the fruit, which are from two to three inches long, distinguish it from the Q. *robur*, the fruit of which is sessile. It ripens its acorns in October.

Almost every part of the oak is astringent, but the bark only is officinal; and, as its epidermis is perfectly inert, it is taken for medicinal purposes from the smaller branches, the epidermis of which is still thin, and scarcely cracked. The bark cut in spring is preferable to that which is cut in winter, as it contains four times the quantity of the astringent principle or tannin.[1]

Qualities.—Oak bark is inodorous, has a rough astringent taste, and yields its virtues to both alcohol and water. The watery effusion is affected by all those tests which indicate the presence of gallic acid, tannin, and extractive (see *Decoctum Quercus*). Sir H. Davy[2] found that ℥j. of the inner cortical part of young oak bark affords, by lixiviation, 111 grains of solid matter, of which 77 are tannin; the cellular integument, or middle-coloured part, yields grs. 43 only of solid matter, of which 19 are tannin; and the epidermis furnished scarcely any quantity either of tannin or of extractive. The quantity of tannin, however, varies according to the size and age of the trees, and the season at which they are barked. Vauquelin discovered that the infusion of oak bark does not precipitate tartarized antimony, nor the infusion of Santa Fe cinchona, which resembles the officinal red cinchona, although both of these are precipitated by infusion of galls.

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[1] Biggin. *Phil. Trans.* 1799.

[2] *Phil. Trans.* 1803.

I find, however, that infusion of oak bark forms a precipitate with infusion of yellow cinchona bark; and with solutions of the salts of quina and cinchonia.

Medical properties and uses.—Oak bark is tonic and astringent. It has been given, united with bitters and aromatics, with seeming advantage, in intermittents; but it is in every respect inferior to cinchona, and cannot be depended on. It is, however, useful in obstinate diarrhœa and alvine hæmorrhages; and it is strongly recommended in the malignant coryza (*snuffles*) of infants, when, in spite of keeping the bowels regular, and the use of cordials, the child becomes weak and pallid.[1] Its principal use is as a local astringent. (See *Decoctum Quercus.*)

The dose in substance may be from grs. xv. to grs. xxx.: but it is so difficult to pulverize, that it is seldom given in this form.

Officinal preparations.—*Decoctum Quercus,* L. *Extractum Quercus,* D.

QUINA. Vide *Cinchona.*

RANUNCULUS. *Spec. Plant. Willd.* iv. 1307.

Cl. 13. *Ord.* 6. Polyandria Polygynia. *Nat. ord.* Ranunculaceæ.
G. 1086. *Calyx* five-leaved. *Petals* five, with a melliferous pore within the claws. *Seeds* naked.

J hott

* *With simple leaves.*

Species 1. R. *Flammula,* Lesser Spearwort. *Eng. Bot. t.* 387. *Fl. Dan. t.* 575. *Curt. Fl. Lond.* 6. *t.* 37. *Med. Bot.* v. 5. *p.* 54. *t.* 15.

** *With divided leaves.*

Species 45. R. *acris.* Upright Meadow Crowfoot. *Eng. Bot. t.* 652. *Curt. Flor. Lond.* 1. *t.* 39. *Med. Bot.* 3d edit. v. 3. *p.* 482. *t.* 172.

Elizabeth Russell
Emily Norman

1. RANUNCULUS FLAMMULA.

Officinal. RANUNCULUS FLAMMULA HERBA, RECENS, *Dub.* The fresh herb of Lesser Spearwort.

Syn. Renoncule petite Douve (*F.*).

This indigenous species of ranunculus is common in moist and marshy places; flowering in May and June, and continuing in flower the greater part of the summer. The root consists of long, simple fibrils, united in fascicles. The stems are spreading, somewhat decumbent, round, smooth, branching, and leafy. The leaves are alternate, lanceolate, and supported on long, channelled petioles, dilated at the base, near the root; linear-lanceolate on the upper part of the stem; pointed, smooth, sometimes entire, occasionally sparsely

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[1] Underwood, *Diseases of Children,* 4th ed. i. 45.

serrated. The flowers are of a bright yellow colour, shining, supported on the extremities of the stems, solitary, or on bifurcated peduncles. The calyx is reflex and smooth; the nectary is minute; the seeds are smooth.

Qualities.—Like all the species of ranunculus, lesser spearwort is acrid and caustic; but its acrimony is diminished by drying, and altogether destroyed by boiling water.

Medical properties and uses.—The fresh herb is rubefacient and epispastic: the distilled water is emetic, and is recommended by Dr. Withering as the best emetic in cases of poisoning: it operates as rapidly and with less distress to the patient than sulphate of zinc.

2. RANUNCULUS ACRIS.

Officinal. RANUNCULUS ACRIS, FOLIA, *Dub.* The leaves of Upright Meadow Crowfoot.

Syn. Bouton d'Or (*F.*).

This species of ranunculus is also indigenous. It is common in meadows and waste places; flowering in June and July. The root is tuberose, furnished with long simple fibres. The stem is erect, about two feet in height, somewhat villous, furnished with few leaves, and branching above. The leaves are tripartite, quinquepartite, and multifidous; the radical leaves are supported on long petioles; the upper are nearly sessile and linear. The flowers are terminal, large, of a brilliant yellow colour, supported on round hairy peduncles. The calyx is spreading and hairy; the nectary is covered with an emarginate scale.

Qualities.—The leaves are bitter and acrid to the taste[1]; and inflame the skin when they are applied to it.

Medical properties and uses.—The leaves of upright meadow crowfoot are rubefacient. They are bruised and applied as a remedy in scabies, and some other cutaneous diseases, in Norway; and in Iceland are used as a vesicatory. It is probable that they have found a place in the Dublin Pharmacopœia on account of their rubefacient properties.

RHAMNUS. *Spec. Plant. Willd.* i. 1092.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Rhamnaceæ.

G. 405. *Calyx* tubular. *Corolla,* scales defending the stamens, inserted into the calyx. *Berry.*

* *Thorny.*

Species 1. R. *catharticus.*[2] Purging Buckthorn. *Med. Bot. 3d edit.* 594. *t.* 210.

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[1] Cattle leave this plant untouched, however scanty their pasture may be; indeed all the species of ranunculus are equally rejected.

[2] *Purgierdorn* (G.), *Purgerende wegedoorn* (Dutch), *Korsbaerton* (Dan.), *Gelappel* (Swed.), *Ramno cartico* (S.), *Escambrociro* (Port.), *Pridoroschnaja igolka* (Russ.), *Szaklak krzewia* (Pol.).

Officinal. RHAMNUS, *Lond.* RHAMNI CATHARTICI SUCCUS, *Edin.* RHAMNUS CATHARTICUS; BACCÆ, *Dub.* Buckthorn berries.

Syn. Nerprun (*F.*), Kreutz beeren (*G.*), Bacche del spino Cervino (*I.*).

This is an indigenous shrub, growing in woods and hedges near brooks; flowering in May and June, and ripening its fruit in October. It rises with a strong, rigid, woody stem, sending off alternate round branches, which terminate in a spine. The leaves are in fascicles, on footstalks, ovate, serrated, nerved; and the younger are downy: the flowers come from the same buds as the leaves; they are peduncled, of a greenish yellow colour, four-cleft; and frequently, but not always, they are male and female upon different plants: the anthers are round, on short filaments which rise from the base of a small convex scale: the germen is ovate, with a slender style and four-cleft stigma: the fruit is a small, round, black, four-seeded berry, about the size of a pea, compressed on one side.[1]

These berries are said to be often mixed with those of the black-berried alder and of the dogberry tree: but as the buckthorn berry has four seeds, while the others have only two and one, it can be easily distinguished.

Qualities.—The odour of these berries is faint and unpleasant; the taste bitterish, acrid, and nauseous. They are very succulent, and yield by expression a deep green juice, or a purple juice if they be gathered late in the autumn; but it soon ferments, acetic acid is formed, and the juice becomes red.

Medical properties and uses.—The berries, and their expressed juice, are briskly cathartic; but their operation is accompanied with thirst and severe griping, which is not altogether mitigated by the most plentiful dilution. They were formerly much used as a hydragogue purgative, but are now very seldom prescribed. The dose of the recent berries is ℈ j., of the dried ʒj., and that of the expressed juice f ℥j.

Officinal preparation.—*Syrupus Rhamni*, L. E.

RHEUM.[2] *Spec. Plant. Willd.* ii. 488.

Cl. 9. *Ord.* 3. Enneandria Trigynia. *Nat. ord.* Polygonaceæ.

G. 803. *Calyx* none. *Corolla* six-cleft, persistent. *Seed* one.

Sp. 2. R. *undulatum.* Waved-leaved Rhubarb. *Amœn. Acad.* iii. 212. *t.* 4.

Sp. 3. R. *palmatum.* Palmatum Rhubarb. *Med. Bot. 3d edit.* 662. *t.* 231. *Phil. Trans.* iv. 292. *t.* 12, 13.

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[1] The pigment called sap green is the inspissated juice of this berry, with the addition of an alkali.

[2] Ῥῆον Dioscoridis. The rhubarb of the Greeks was the root of Rheum *Rhaponticum.*

1. RHEUM UNDULATUM.

Officinal. RHEUM UNDULATUM; RADIX, *Dub.* The root of Waved-leaved Rhubarb.

This species of rheum was supposed by Boerhaave to be the true Chinese rhubarb; and, as it is not unlikely that foreign rhubarb is taken from several species, that which we receive by way of Canton, which certainly differs, more than simply in the drying, from that which comes through Russia, may be the produce of this plant: on this account the Dublin College has given it a place in the list of materia medica.[1] It is a native of China and Siberia, but grows well in this country. The root divides into a number of thick fibres, which run deep, and are extremely yellow within; the leaves, which appear early in the spring, are supported on moderately thick footstalks, channelled on their under side, and plain on their upper: the leaves are long, running to a point, much waved on their edges, a little hairy on the upper surface, and very strongly veined on the under: the flower-stem is of a pale brownish colour, rising about four feet high, and dividing into several loose panicles, or bunches of white flowers, which appear in May, and are succeeded by triangular seeds that ripen early in the season.

2. RHEUM PALMATUM.

Officinal. RHEUM, *Lond.* RHEI RADIX, *Edin. Dub.* Rhubarb root.

Syn. Aechte Rhabarber (*G., Dutch, Dan., Swed.*), Ruibarbo (*S., Port.*), Haihoung, or E-Tah-ro-ang (*Chinese*), Daiwoo (*Japanese*), Variātoo Kālung (*Tam.*), Ruwend (*Arab.*), Reywand (*Pers.*), Réwund Chini (*Duk.*).

This species, like the former, is a native of China and Tartary: it is said to grow on the snowy mountains of Boutan and of Dauria, and arrives at considerable perfection when cultivated in this country. The root is perennial, thick, oval, branched, externally brown, and internally of a deep yellow colour: the stem, which rises eight or ten feet in height, is erect, round, hollow, jointed, very slightly furrowed, and maculated with small, oblong, purple streaks: the lower leaves stand upon long smooth petioles[2]; are numerous, large, divided into five segments, which are deeply sinuated, toothed, and strongly ribbed, the petiole being divided at its apex into the five midribs of the segments; of a deep green colour, rough above, and pale and villous below: those of

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[1] Some seeds given by a dealer in rhubarb to Kauw Boerhaave yielded plants both of the R. *undulatum* and R. *palmatum*.

[2] These make a much better tart than the leaf-stalks of R. *undulatum*, the species generally employed by the pastrycook.

the stem spring from the joints, are also petiolate, and gradually lessen in size towards the top of the stem; there is a sheathing stipule or *ochrea* at the base of each stem-leaf. The flowers spring from the axilla of the base in numerous panicled clusters: they appear in May: the corolla is divided into six obtuse segments, of a greenish white colour, tinted with light pinkish purple[1]: the filaments are nine, slender, the length of the corolla, and furnished with oblong double anthers: the style is short, with three reflected capitate stigmas; and the germen is a triangular seed, enclosed in a capsule with three membranous reddish margins or alæ.

This plant has been generally believed to be the species which yields the foreign rhubarb; and, under this belief, a very excellent and correct description of it was given by Dr. Hope, Professor of Botany at Edinburgh, in the Philosophical Transactions for 1765. He had raised it from seed sent to him by Dr. Mounsey from Petersburgh two years before, and found that the root possessed all the medicinal qualities of the best foreign rhubarb. Since that period, many laudable attempts have been made to introduce the cultivation of rhubarb into this country, in sufficient quantity to supply our domestic consumption of this valuable drug: but although many individuals have reared large quantities, and some of it has been extremely good, yet so powerful is prejudice, that very little of it can be sold, and the efforts, therefore, of the cultivators have of late very much relaxed.[2] It is still, however, uncertain which of the species of rheum yields the foreign rhubarb; nor is it of very great importance, as the roots of the two species above described, and of another, the R. *Australe* or *Enodi*, accord so very closely in their medicinal powers, that any of them may be used with equal certainty of success.[3] The R. *compactum* accords with the accounts given by the Bucharians of the plant and the form of the leaf, which,

1 Qy. Whether is the floral envelope calyx or corolla?—It is white at first, becomes red and succulent, and is persistent.

2 For an excellent account of those different trials, and some very judicious observations on the mode of cultivating rhubarb, see *Miller's Dictionary*, edited by Dr. Martyn, article *Rheum*.

3 The latest account of rhubarb is given by my friend and late pupil, Mr. Royle, in the Calcutta Medical Transactions for 1827. He says one species, R. *enodi* of Wallich, is found in great abundance on the Chur mountain, at an elevation of 9,000 feet. He adds, "the table land of Tartary is covered with Rhubarb at the height of 16,000 feet; and there is abundance at Ludak, in lat. 37°, whence some of very fine quality was sent to Captain Kennedy by Mr. Moorcroft."—*Trans. of the Med. and Phys. Soc. of Calcutta*, vol. iii. p. 440. Mr. Royle, who is now (1833) in England, does not think that R. *enodi* yields the officinal rhubarb.

according to Sievers, they describe as round, dentated on the margin, with almost spinous processes, but it has a white root. The R. *Rhaponticum*, which is supposed to be the rhubarb of the ancients, yields good rhubarb.

Three varieties of rhubarb are known in the shops, named from the places whence we receive them; *Russian* rhubarb, *Turkey* rhubarb, and *East India* or *Chinese* rhubarb. The two first resemble one another in every respect, appearing to be the root of the same species of Rheum prepared in the same mode; and although the East Indian is seemingly the root of a different species, yet we are informed by Dr. Rehman[1] that it is the same, only prepared with less care.

All the rhubarb of commerce, known under the names Turkey or Russian, grows on the declivities of the chain of mountains in Tartary, which stretches from the Chinese town Si-ning to the Lake Koko Nor, near Thibet, the source of the river Chou-cho. The soil is light and sandy; and the Bucharians assert that the best grows in the shade, on the southern side of the mountains. Rhubarb, however, is also cultivated in China, in the province of Shen-see, where it is called *haihoung*. In Tartary the roots are taken up twice a year, in spring and in autumn[2]; and after being cleansed and decorticated, and the smaller branches cut off, the body of the root is divided transversely into pieces of a moderate size, which are placed on tables, and turned three or four times a day, during five or six days. A hole is then bored through each piece, by which it is hung up to dry, exposed to the air and wind, but sheltered from the sun. In Bontom they are hung up in moderately heated drying rooms. In about two months, the roots have lost seven parts in eight of their weight[3] and are fit for the market. In China the roots are not dug up till winter[4]; and the cultivators, after cleaning, scraping off the bark, and cutting them, dry the slices by frequently turning them on stone slabs heated by a fire underneath; after which the drying is completed by hanging them up in the air, exposed to the greatest heat of the sun.[5] As

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1 The best treatise on the Commerce of Rhubarb, and from which much of the information contained in this article has been taken, is from the pen of Dr. Rehman. Vide *Mém. de la Société Impériale des Nat. de Moscow*, 1809, t. ii. p. 126.

2 *Bell's Travels.*

3 *Bath Papers*, iv. 175.

4 *Bath Papers*, ii. 249.

5 It is in the process of drying the roots that the British cultivators of rhubarb are supposed to fail. Baumé proposes to steep the roots in water, to deprive them of their gummy matter, before drying them; then to lay them upon twigs in the open air for twelve hours, and lastly to place them in a stove heated to 120°, till they are dried. When sufficiently dry, the wrinkles must be rasped out, and the pieces shaken together in a barrel, turned on an axis, for half an hour, which covers them with a fine yellow powder formed by their attrition.

soon as the rhubarb has been dried where it is grown, it is conveyed to Si-ning, where it is again cleaned and aired: and, after being cut into smaller pieces and sorted, a large hole is drilled through that intended for the Russian market, in virtue of the contract made with the Russian government, for the examination of the heart of the pieces. It is then packed up in camel's hair sacks, and conveyed to Mac-ma-tchin, where it is examined previously to its being transported to Kiachta. The whole of the trade in rhubarb in China is carried on by one Bucharian family, which has enjoyed the monopoly since 1772; and it is even by the agents of this family that it is sold to the English at Canton. This Bucharian family resides at Si-ning Fu, a town on the frontiers of Thibet, about 3,000 versts from Kiachta, the town on the Russian frontier where the rhubarb is purchased on the account of the Russian government. Part of the Tartarian rhubarb is carried to Turkey through Natolia; thence the name Turkey rhubarb: but the greater part is conveyed by the Bucharians to Kiachta, where it is examined by a Russian apothecary. The best pieces only are selected and sent to Petersburgh. The pieces are roundish, perforated with a large hole; they are of a yellow or reddish colour on the outside, somewhat soft and friable, and, when broken, exhibit many diverging streaks of a beautiful bright red colour. Agreeably to the contract with Russia, all the rhubarb which is rejected must be burnt; and even that which is approved must undergo another cleaning before it is finally packed up for St. Petersburgh.[1]

The *Chinese rhubarb*, at least what we receive under that appellation, is conveyed to Canton, and there purchased by the East India Company's agents, who purchase all qualities; whence it is brought to this country by sea. It is in oblong, round, and flat pieces, sometimes perforated, but with a smaller hole than the Russian rhubarb; considerably heavier, more compact, and less friable than the former kind; of a brownish yellow colour on the outside; and, when broken, the fracture is hackly, appears of a dull colour, and variegated with yellow, pink, and white. The flat pieces are prepared by rasping the spongy alburnum from the round pieces; and thus prepared the rhubarb sells at one third more than the unrasped root. Both kinds are brought to this country in cases and chests.[2]

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[1] At this examination, each piece is struck with a small mallet, to detach from it any impurities or decayed parts.

[2] Rhubarb sometimes appears worm-eaten; a circumstance which arises from its being eaten, in its dry state, by a small beetle, Sinondendrum *pusillum.*—*Kirby and Spence's Entom.* vol. i. p. 252.

Qualities.—Good *Russian* or *Turkey* rhubarb has a peculiar, somewhat aromatic odour, and a bitter, slightly astringent, subacid taste; feels gritty between the teeth when chewed, and tinges the saliva of a bright yellow colour. It breaks with a rough hackly fracture, is easily pulverized, and affords a powder of a bright buff-yellow colour. It should not be porous, but rather compact and heavy. Water at 212° takes up 24 parts in 60, forming an infusion of a pale brown colour, nearly clear, reddening litmus paper, and striking a deep brown with alkalies. Alcohol extracts 2·7 from 10 parts, and gives a tincture of a rich golden colour, which reddens tincture of litmus, is not altered in its transparency by the addition of water, and strikes a blackish olive hue with solution of sulphate of iron, but no immediate precipitate falls. Sulphuric ether takes up 1·5 in 10 parts of this rhubarb; the tincture is of a golden yellow hue, and when evaporated on water leaves a thin pellicle of yellow resin, and abundance of extractive dissolved in the water, combined, however, with tannin. According to the analysis of M. Henry, it contains a yellow colouring matter, a bland oil, fecula, a small quantity of gum, tannin, lignin, oxalate of lime, supermalate of lime, sulphate of lime, a salt of potassa, and oxide of iron.[1]

East Indian or *Chinese* rhubarb has a stronger odour, tinges the saliva of an orange hue, and is more nauseous to the taste than the Turkey; breaks with a more compact and smoother fracture; and affords a powder of a redder shade. Water takes up 30 parts in 60; the infusion is not so deep-coloured as that of Russian rhubarb, is more turbid, reddens also litmus paper, and is browned by alkalies. Alcohol extracts 4 parts in 10; the tincture is of a much deeper colour, and brownish; gives a deeper red to litmus tincture; is rendered slightly turbid by the addition of water; and strikes a green, not blackish olive, with sulphate of iron, which it also quickly and copiously precipitates. Ether takes up 2 parts in 10; the tincture is deeper coloured; and, when evaporated on water, affords the same results as the former kind, except that the compound of tannin and extractive is more soluble.

The infusion of Chinese rhubarb is more copiously precipitated by solution of isinglass than that of the Russian. Infusion of yellow cinchona bark throws down a copious greenish precipitate from infusion of Russian rhubarb, and a less copious, but more dense, bright yellow precipitate from that of Chinese rhubarb.

The following Tables show the effects of re-agents on the aqueous infusions of the two varieties of rhubarb.

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[1] *Bulletin de Pharm.* t. vi. p. 87.

TABLE I. Precipitates formed by Acids, Alkalies, and Neutral Salts.

Variety of Rhubarb.	Sulphuric Acid.	Nitric Acid.	Hydrochloric Acid.	Solution of Chlorine.	Solution of Potassa.	Solution of Carbonate of Potassa.	Lime-water.	Chloride of Barium.	Silicated Potassa.
Russian.	copious, greenish yellow.	scanty, flocculent, pale yellow.	scanty, very slowly formed, yellow.	slowly formed, pale olive.	none, but strikes a deep lake colour.	none, but strikes reddish brown.	scanty, slowly formed, brown.	scanty, olive green.	none, but strikes a deep brown.
Chinese.	more copious, brownish yellow.	less scanty, pale yellow.	scanty, quickly formed, brownish yellow.	slowly formed, orange yellow.	none, a deeper lake.	none, but renders it turbid, and deep reddish brown.	copious, quickly formed, brown.	less scanty, orange yellow.	none, but strikes a deep brown.

TABLE II. Precipitates formed by Solutions of Metallic Salts.

Variety of Rhubarb.	Solution of Sulphate of Iron.	Solution of Nitrate of Silver.	Solution of Nitrate of Mercury.	Solution of Nitrate of Lead.	Solution of Bichloride of Mercury.	Solution of Acetate of Lead.	Solution of Tartar emetic.
Russian.	copious, nearly black.	scanty, pale greenish yellow.	copious, olive yellow.	scanty, slowly formed, yellow.	scanty, slowly formed, pale olive.	scanty, greenish yellow.	scanty, slowly formed, white.
Chinese.	opious, deep olive green.	copious, orange yellow.	copious, heavy, bright yellow.	scanty, slowly formed, deeper yellow.	copious, quickly formed, heavy, yellow.	copious, yellow.	scanty, still more slowly formed.

When the residue, after the action of water, is digested in hydrochloric acid, and solution of ammonia added in excess to the solution, the liquid becomes of a deep purple colour, then somewhat milky, and deposits oxalate of lime. What remains consists of woody matter, a small portion of albumen, and silex. Of the specimens which I examined, one drachm of Russian rhubarb yielded twenty-six grains of the oxalate, while the same weight of East Indian yielded eighteen grains: M. Henry procured only 30 per cent., and Schrader not more than 4·5!

From the results of my experiments, rhubarb appears to contain a large portion of *extractive matter*, a very small portion of *resin*, *mucus*, *tannin*, or rather a principle analogous to it, *gallic acid*, a *colouring matter*, much *oxalate of lime*, and minute proportions of *alumen* and *silex*.[1] According to the analysis of M. Henry, the Russian and Chinese rhubarb contain of resin and extractive—R. 44. C. 39·35. + gum, R. 5·5. C. 6. + starch, R. 4·8. C. 12·86. + albumen, R.—C. 0·2. + oxalate of lime, R. 29·98. C. 32·8. + lignin, R. 10·62. C. 11·2. From this and other analyses no opinion can be formed of the active principle of rhubarb.

The preceding tables show, that the two varieties differ from each other in several respects. The Russian contains more tannin, oxalate of lime, and resin than the Chinese; the Chinese more extractive and gallic acid than the Russian. Besides these components, M. Henry found a *fixed oil* soluble in ether and alcohol, an amylaceous matter, supermalate of lime, sulphate of lime, and a salt with a base of potassa.[2] But the purgative principle is still unascertained, although it appears to be combined with the extractive, and hence is soluble in water.[3] M. Hornemann ascribes it to a new

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[1] According to some experiments published by Mr. John Henderson, in the *Annals of Philosophy*, rhubarb is supposed to contain also a peculiar acid, to which he has given the name of *Rheumic*; but M. de Lassaignes has proved, that this is the oxalic acid: which agrees with the result of our analysis. It is remarkable, that Mr. Brande, in an analysis of rhubarb, published in the *Quarterly Journal of Science*, vol. x., does not notice either oxalic acid or any oxalate as being contained in this root, although they have been found and are mentioned by every other analyst who has examined rhubarb. But it is still more extraordinary, that Mr. Brande has asserted, that "no chymical investigation into the nature of rhubarb, if we except a few experiments upon it, given in Neumann's Chemistry," had been made prior to his own; while every one acquainted with pharmaceutical chymistry knows that (not to mention my analysis) it has been examined by Scheele, Bayen, Deluval, Vauquelin, M. Clarion, De Lassaignes, M. Henry, Heyer, Schrader, &c.; all of whom mention oxalic acid and oxalate of lime among its components.

[2] *Journal de Pharm.* tom. iv.

[3] M. Najni of Milan, imagines he has discovered a new alkali in rhubarb. See account of the experiments in *Brande's Journ.* No. xxxii. p. 172.

proximate principle which he has discovered, and named *Rheumine.* The colouring principle is the *Rabarbarine* of Caventou.[1]

Medical properties and uses.—Rhubarb is stomachic and astringent or purgative, according to the extent of the dose in which it is administered. With a view to the first-mentioned properties, it is usefully given in dyspepsia, hypochondriasis, and a weakened, relaxed state of the bowels, combined with ginger, nutmeg, soda, or bitters.

As a purgative it operates mildly, and may be given to the youngest infants. Its operation is quickened by the addition of neutral salts and calomel, the purgative powers of which it also reciprocally augments: so that a compound, formed of small portions of rhubarb and a neutral salt or calomel, acts with more certainty and quicker than large doses of either, separately taken. Rhubarb is particularly adapted for the majority of cases of diarrhœa, as it evacuates any acrid matter that may be offending the bowels, before it acts as an astringent. In some persons it causes convulsions, owing to a peculiar idiosyncracy. Externally it has been applied by friction to produce its pargative effects[2], and its powder is sometimes sprinkled over ulcers to assist their granulation and healing. It colours the urine in the space of twenty minutes after it is taken; and may be detected by the aid of an alkali. It disappears after an hour or two, but re-appears, owing to a second absorption from the colon.[3] Bradner Staart also affirms that it can be detected in the urine after using a bath impregnated with it!

The Chinese use it medicinally; but they chiefly employ it to colour a spirituous liquor.

Rhubarb is given in a variety of forms (see Preparations), but its purgative properties are most powerful in substance. From ℈ j. to ʒ ss. of the powdered root opens the bowels freely; and from grs. vi. to grs. x. may be given for a dose, when its stomachic properties only are required.

Officinal preparations.—*Infusum Rhei,* L. E. D. *Vinum Rhei,* E. *Tinctura Rhei,* E. *Tinctura Rhei composita,* L. D. *Tinctura Rhei et Aloes,* E. *Tinctura Rhei et Gentianæ,* E. *Extractum Rhei,* L. D. *Pilulæ Rhei compositæ,* L. E.

RHODODENDRON. *Spec. Plant. Willd.* ii. 603.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Ericaceæ.

G. 867. *Calyx* five-parted. *Corolla* nearly funnel-shaped. *Stamens* declined. *Capsule* five-celled.

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[1] The sulphate of M. Najni is said to be a sulphate of lime coloured by the colouring principle of the root.

[2] *Nouveaux Elem. de Thérap. par Alibert,* tome ii. p. 247.

[3] Sir E. Home.

Species 7. R. *chrysanthum.* Golden-flowered Rhododendron.
Med. Bot. 2d edit. 299. *t.* 103. *Pall. Ross.* i. *p.* 44. *t.* 30.
Officinal. RHODODENDRI CHRYSANTHI FOLIA, *Edin.* The leaves of Rhododendron.

Syn. Rosage (*F.*), Gelber Alpbalsam (*G.*), Rhododendro Aureo (*I.*), Sabina (*Russ.*), Kaschkara (*Koibal*), Schei (*Tartar*).

This beautiful shrub is a native of the mountainous parts of Siberia, flowering in June and July. It rises a foot in height, and sends off spreading branches, which are covered with a brown bark. The leaves are terminal, oblong, ovate, and attenuated to the petiole; few, smooth, stiff, with the margin entire and bent in: the upper surface reticulated, rugged, and of a deep green colour; and the under ferruginous or glaucous. The flowers are large, yellow, and terminate the branches, forming umbels: the calyx is persistent; the corolla monopetalous, inclining, and regularly divided into five spreading segments: the filaments are slender, nearly as long as the corolla, supporting oval anthers; and the germen is pentagonal, bearing a long slender style, crowned with a five-lobed stigma. The capsule is ovate, somewhat angular; and contains many small grey irregular seeds, like sawdust.

Qualities.—The leaves of this plant are inodorous, and have an austere, astringent, bitterish taste. Water extracts their virtues either by infusion or decoction. Stolze procured oxidized extractive, soluble extractive, tannin, green wax, extractive obtained by potassa, and fibre in the dried leaves.

Medical properties and uses.—Yellow rhododendron leaves are stimulant, narcotic, and diaphoretic. When taken, they first increase the arterial action and the heat of the body, producing diaphoresis; and these effects, according to Dr. Home's observations, are followed by a proportional diminution of excitement; the pulse, in one case, having been reduced thirty-eight beats. In large doses they produce nausea, vomiting, purging, delirium, and all the violent symptoms of intoxication. Both the plant and its effects were first described[1] by Gmelin and Steller, in 1747, as a Siberian remedy for rheumatism; but it was not much noticed till after 1779, when Kœlpin strongly recommended it in that disease, and also in gout and lues venerea. Besides the effects we have already mentioned, it is said to excite a creeping sensation in the pained parts, which after a few hours subsides, and at the same time the pain is relieved. It has not been much used in this country, but, from the result of some trials of it in

[1] *Flora Sibirica*, iv. 121.

Scotland, it has obtained a place in the Edinburgh Pharmacopœia.

It is given in the form of decoction, made by boiling ʒ iv. of the leaves in f ℥ x. of water in a close vessel, over a slow fire, for twelve hours. The dose of the strained liquor is from f ℥ j. to f ℥ ij. given twice a day, and gradually increased.

RHUS[1]. *Spec. Plant. Willd.* i. 1479.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Anacardiaceæ.

G. 566. *Calyx* five parted. *Petals* five. *Berry* with one seed.

** *With ternate leaves.*

Species 17. R. *Toxicodendron.* Poison Oak. Sumach. *Kalm's Travels,* ii. 318.

Officinal. TOXICODENDRI FOLIA, *Lond.* RHOIS TOXICODENDRI FOLIA, *Edin. Dub.* Sumach leaves.

Syn. Toxicodendron, Herbe à la Puce (*F.*), Giftsumach (*G.*), Vergiftboom (*Dutch*), Rus Tossicodendre (*I.*).

This shrub is a native of North America. It seldom exceeds three feet in height; the root sending up many stems, which divide into slender, woody branches, and are covered with a brownish bark. The leaves are placed alternately, supported on long petioles; and are composed of three oval leaflets, about three inches long, and one inch and a half broad, angularly indented, hoary on the under surface, and of a deep shining green colour on the upper: the two lateral leaflets are nearly sessile, and the terminal one is considerably the largest of the three: the male flowers, which are on a distinct plan from the female, spring from the sides of the stalks in close short spikes, and are of an herbaceous colour; the female, which are larger, are produced in loose panicles, and embosom a roundish germen, supporting three very short styles: the fruit is a striated berry.

The stems, if cut or broken, exude a milky juice, which was supposed to inflame the skin wherever it touched: but this is not the case, although the plant exudes a deleterious vapour.[2] The juice becomes black when it is exposed for a short time to the action of atmospheric air.[3]

Qualities.—The leaves of toxicodendron are inodorous, and have a mawkish, subacrid taste. Their virtues are com-

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[1] Ῥοῦς Dioscoridis.

[2] Vans Mons has proved that the acrimonious matter of the plant is exhaled during the night, combined with carbonated hydrogen gas. He collected a jar full of the gas, into which his brother, who was very susceptible of the poison of this species of rhus, plunging his arm, the skin was quickly inflamed and blistered. *Actes de la Soc. de Méd. de Bruxelles.*

[3] This juice forms an indelible black stain on linen cloth; and is used in Japan, where the shrub is a native, as a varnish.—*Phil. Trans.* xlix. 158.

This juice forms an ind

pletely extracted by water, and partially by alcohol. The aqueous infusion reddens litmus paper; precipitates the solution of sulphate of iron black; that of nitrate of silver brown; and throws down a precipitate with gelatine. Hence it contains gum, resin, gallic acid, and tannin; but a narcotic principle is also present, on which its effects principally depend.

Medical properties and uses.—The leaves are stimulant and narcotic. In the hands of Dr. Alderson of Hull, who introduced them as a remedy, they proved successful in several cases of paralysis, especially in paraplegia; and they have been found equally efficacious in the hands of M. Bretonneau of Tours; but we believe their efficacy in this disease has not been confirmed by the observations of other English physicians. They excite a sense of heat and pricking, and irregular twitchings in the affected limbs. We believe some advantage has been found from their use in herpetic eruptions; but this has not been very satisfactory. They have also been found useful in the form of tincture, in cramp of the stomach.

The dose of the powdered leaves may be grs. v., given twice or thrice a day, and gradually increased to ℈j., in the form of a bolus.

RICINUS. *Spec. Plant. Willd.* iv. 564.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Euphorbiaceæ.
G. 1720. *Male.* *Calyx* five-parted. *Corolla* none. *Stamens* numerous.
——— *Female.* *Calyx* three-parted. *Corolla* none. *Styles* three, bifid. *Capsule* three-celled. *Seed* one.
* *With palmated leaves.*
Sp. 1. R. *communis.*[1] Common Ricinus, or Palma Christi. *Med. Bot. 3d edit.* 625. *t.* 221. *Rheede, Hort. Malab.* ii. 57. *t.* 32.
Officinal. RICINI OLEUM, *Lond.* RICINI COMMUNIS SEMINA; ET OLEUM FIXUM, *Edin.* RICINUS; OLEUM E SEMINIBUS, *Dub.* The seeds, and the fixed oil of the seeds of the Ricinus. Castor Oil.

Syn. La noix et l'huile du Ricin (*F.*), Rizinuskorner Rizinusöhl (*G.*), I semi e l'olio di Ricino (*I.*), Palmoel, Ricinsoel (*S.*), Erundatylum (*San.*), Duhnul Kirwa (*Arab.*), Sittāmoonāka ūnnay (*Tam.*), Endooroo tail (*Cyng.*), Rowgen Bedangur (*Pers.*), Miniak jarak (*Malay*), Linga-jarak (*Jav.*).

This species of ricinus is an annual plant, a native of Greece[2], Asia, Hindostan, the East and West Indies, South

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[1] Κικι Dioscoridis.

[2] At Pamisus, in the Morea, where it grows in great abundance, it is called agra staphylia, or wild vine, from the resemblance of its leaves to those of the vine.—*Gell's Journ. in the Morea*, p. 193. In the Bosphorus it is called Kroton, from the resemblance of the seeds to the tick insect which fastens on dogs' ears.—*Hort. Trans.* vol. vi.

America, and Africa.[1] It is also abundant on the rock of Gibraltar. It is of very quick growth, and sometimes attains to the height of sixteen feet.[2] The stem is round, thick, jointed, furrowed, glaucous in the lower part, but of a purplish red colour towards the top: the leaves are petiolate and subpeltate, large, deeply divided into seven pointed serrated lobes, and of a bluish green colour: the calyx of the *male* flower is composed of five oval, pointed, purplish segments, enclosing many long stamens united at the base; the *female* is at the upper part of the spike, and is composed of a three-cleft reddish calyx: the styles are three, slender and forked at the apex: the capsule is a trilocular nut, covered with rough spines, and bursting elastically to expel the seeds; which are generally three, of an oblong flat figure, and of a black colour dotted with white.

The oil, which is more frequently used than the seeds, is obtained from the seeds both by coction and expression. The former method was generally used till lately; and was performed by tying up the seeds, previously decorticated and bruised, in a bag, which was suspended in boiling water, till all the oil was extracted, and rose to the surface of the water, when it was skimmed off. This mode of preparation is still preferred by many of the West Indian practitioners; but the oil is apt to get soon rancid when it is thus prepared. It is now obtained, both at home and abroad, by subjecting the seeds to the press, in the same manner as almonds to procure almond oil. The oil obtained by expression is equal to one fourth of the weight of the seeds employed. The acrid principle is contained in the cotyledons, and in the embryon, but not in the testa. It is of a volatile nature. Castor oil is often adulterated with olive oil, linseed oil, and poppy oil, which, however, may be readily detected by adding an equal quantity of *alcohol* of sp. gr. ·820 to any given quantity of the suspected oil: if it be pure, a uniform solution will take place, which will not happen should it be adulterated; and the same will be the case, if a weaker spirit be employed, with the addition of camphor.

Qualities.—Good expressed castor oil is nearly inodorous and insipid; but even the best leaves a slight sensation of acrimony in the throat after it is swallowed. It is thick, viscid, transparent, and colourless, or of a very pale straw-colour; that which is obtained by coction has a brownish

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[1] It was first cultivated in Britain in 1562. It thrives in the South of France.

[2] It has been asserted that this plant is in some places perennial, becoming a large tree. Willdenow, however, says, "Planta semper, annua, nunquam fruticosa vel arborea, nec in calidissimis terræ plagis lignescit."—*Spec. Plant.* iv. 564.

hue; and both kinds, when they become rancid, thicken, deepen in colour to reddish brown, and acquire a hot, very nauseous taste. MM. Busy and Lecanu have obtained three distinct acids from it: the *ricinic*, fusible at 72° Fahr.; the *elaiodic*, fluid below 32° Fahr.; and the *margaritic*, not fusible below 264° Fahr., and crystallizable. It has all the chymical characters of the other expressed oils, except that it is heavier, and saponifies more readily with solutions of potassa or of soda; and racinates, elaiodates, margaritates, and glycerin are formed. It is very soluble in alcohol, and also in sulphuric ether. Mr. Brande says, that it sometimes undergoes such a change in the bowels that it passes off "in round and indurated nodules."[1] But such a circumstance has never come within my knowledge.

Medical properties and uses.—The seeds are drastic cathartics, but are scarcely ever ordered. The oil is mildly purgative, operating very quickly[2], and with so little irritation, as to render it peculiarly fitted for cases in which the stimulating purgatives would prove hurtful; as in ileus, colica pictonum (in which it may be advantageously joined with henbane), calculous affections, piles, and after surgical operations in which the abdominal viscera are concerned. In dysentery, in which this oil is particularly indicated, the stomach will seldom retain it; but, when this is the case, it may be efficaciously exhibited per anum. It is also an excellent purgative for infants, even of the tenderest age, and for women in childbed. As an external application I have found it useful in *Lepra vulgaris*, when rubbed up with the ointment of nitrated mercury, in the proportion of one part of the oil to two parts of the ointment.

The dose is from fʒ iv. to f℥ jss., either floated on a little water and covered with a small quantity of any ardent spirit, or diffused in a cup of coffee; or in cinnamon or mint water, or camphor mixture, by means of mucilage of acacia gum, or the yolk of egg. The addition of some aromatic tincture is generally necessary to make this oil remain on the stomach.

ROCELLA. *Nat. Ord.* Lichenes.

Officinal. ROCELLA TINCTORIA, LITMUS, *Dub.* Litmus.

Syn. Orseille (*F.*), Oricello (*I.*), Orciglia (*S.*).

This is an indigenous lichen, found in Portland Island: but, as an article of commerce, it is obtained from the Levant;

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1 *Manuel*, p. 150.
2 The bark of the root of the tree is a powerful purgative.

and also the Canary Islands[1], which produce annually 2600 quintals. It is a small species, seldom exceeding two inches in height, and is firmly fixed to the rocks by a solid base. From this base rises a tuft of worm-like stems, round, acutely pointed, often curved, more or less branched, smooth, of a white grey or brownish hue, and studded about their upper part with scattered tubercles, replete with white powder, which have been thought the seeds; but the fructification of this species is not well understood.

From this lichen is prepared the Dutch *argol* or *archil* of commerce. It was known to the ancients, being the Λειχην of Dioscorides, and the *Phycos thalassion* of Pliny. Its use as a dye was, however, lost; till it was again accidentally discovered by a merchant of Florence, in 1300[2], observing that urine gave the lichen a fine violet colour. The preparation was long a secret, and was confined to Florence and Holland: but it is now known in England, and large manufactories of it are carried on in London and Liverpool. The lichen, after being dried and cleaned, is reduced to powder in a mill resembling an oil-mill.[3] It is then mixed in a vat with one half of its weight of pearl-ash, and moistened with human urine; fermentation soon succeeds, and is kept up by stirring, and by successive additions of urine, until the colour of the material changes first to red, and then to blue. In this state it is mixed with a third of its weight of good potassa, and spread out to dry.[4] Chalk is sometimes added to it, but with no other view than to increase the weight.[5] It is generally sold in the form of cakes, but sometimes in that of a moist pulp.

Qualities.—Prepared argol has a slight violet odour, arising from orris-root, with which it is always mixed, and a mawkish taste, leaving some degree of pungency in the mouth. When moist, the form of the lichen is evident in the pulp. It communicates to water and to alcohol a beautiful violet colour, which, however, is very evanescent: all acids, and salts with an excess of acid, change it to red, which is again destroyed, and the blue restored by the addition of alkalies; and

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[1] The ancients named the Canaries the Purple Isles, from the abundance of orchilla which they yielded.—*Mém. de l'Acad. des Inscriptions*, tom. iv. p. 457. It forms the only article of vegetation on the northernmost of the Ilhas desertas, near Madeira.

[2] *Thomson's Chymistry*, 4th ed. vol. v. p. 284. *Bancroft, on Philosophy of Colours*, 2d ed. p. 292.

[3] Sometimes it is not ground, but prepared in the entire state.

[4] *Nicholson's Journal*, 4to. ii. 311.

[5] Archill is chiefly used by the dyers, and in times of scarcity it has been sold at 1000*l.* sterling the ton. It is often mixed with the Lichen *fuciformis.*

even exposure to the air of a room, in which many people are assembled, reddens the watery infusion. The tincture is least liable to change when kept, if it be reddened by an acid, and kept in close vessels.

Use.—This species of lichen is said to have been "administered medicinally, with an intention of allaying the tickling cough attendant on phthisis, and in hysterial coughs[1];" but we must suppose the recent lichen is meant, or before it has undergone any preparation as a colouring matter. We know of no other use of the prepared lichen than as a dye-stuff, or as a chymical test of the presence of acids; and it is certainly the most delicate.

ROSA. *Spec. Plant. Willd.* ii. 1603.

Cl. 12. *Ord.* 5. Icosandria Polygynia. *Nat. ord.* Rosaceæ.

G. 997. *Petals* five. *Calyx* pitcher-shaped, five-cleft, fleshy, contracted at the neck. *Seeds* numerous, hispid, affixed to the inner side of the calyx.

* * *With ovate germens.*

Species 15. R. *centifolia.* Hundred-leaved Rose. *Med. Bot.* 3*d edit.* 495. *t.* 178.

Species 16. R. *gallica.* Red Rose. *Med. Bot.* 3*d edit.* 497. *t.* 179.

Species 31. R. *canina.* Dog Rose, or Hep tree. *Med. Bot.* 3*d edit.* 493. *t.* 177. *Smith, Flora Brit.* ii. 540. *Gærtner,* i. 347. *t.* 73.

1. ROSA CENTIFOLIA.[2]

Officinal. ROSA CENTIFOLIA, *Lond. Edin. Dub.* The Hundred-leaved Rose.

Syn. Pétales de Rose à cent feuilles (*F.*), Blumen der Blassen Rose (*G.*), Rosa de Alexandria (*S.*), Rozen (*Dutch*), Rosa (*Russ.*), Wurd (*Arab.*), Gooläbupoo (*Tam.*), Tu Miuhoa (*Chin.*), Gul (*Pers.*), Mawar (*Malay*), Sewooanda mull (*Cyng.*), Goolat (*H.*).

Although this species of rose is commonly cultivated in almost every garden in Europe, yet the place whence it was originally brought is still undetermined, notwithstanding the assertion of Herodotus that it grows wild in Macedon; and that of Loureiro that it is a native of China. Professor Ran has lately informed us that it is indigenous in Northern Persia.[3] In the Dublin Pharmacopœia it is improperly confounded with the damask rose, which is altogether a different species.[4] The bush rises with prickly stems about three feet in height. The leaves consist of two or three pairs of leaflets, with a terminal one, attached on very short petioles to a rough common

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[1] *Translation of the Dublin Pharmacop.* p. 165.

[2] Ῥωδωνια Theophrasti.

[3] *Enumeratio Rosarum circa Wirceburgam,* 1816.

[4] See *Hort. Kew., Willdenow, &c.* Gerarde cultivated this species in 1596.

foot-stalk: the leaflets are oval, broad, smooth, of a deep green colour on the upper surface, hairy on the under, and serrated, with purple edges. The flowers, which appear in June, are large, supported on peduncles beset with brown bristly hairs. The segments of the calyx are semipinnate: the petals large, of a beautiful pale red colour, fragrant, and very numerous.

The varieties of this species of rose are very many; but for medicinal purposes they may be indiscriminately used. The petals only are employed.

Qualities.—Their odour is extremely fragrant, and their taste sweetish, subacidulous, and at last very slightly bitter. In distillation with water, a small portion of a butyraceous oil is obtained; and the water is strongly impregnated with the odour of the rose.

Medical properties and uses.—The petals of this species of rose are slightly laxative[1]; and as such are ordered, combined with sugar, in the form of a syrup, as an adjunct to oil and other purgatives in infantile diseases; but they are chiefly employed for the distillation of rose-water.

Officinal preparations.—*Aqua Rosæ*, L. E. D. *Syrupus Rosæ*, L. E.

2. ROSA GALLICA.

Officinal. ROSA GALLICA, *Lond. Edin. Dub.* The Red Rose.

Syn. Fleurs de Roses rouges (*F.*), Essig-rosen (*G.*), Fransche rosen (*Dutch*), Aettikerosor (*Swed.*), Rosa domestica (*I.*), Rosa rubra ò Castillara (*S.*), Rosa Vermelha (*Port.*).

This species is a native of the south of Europe, cultivated in our gardens, and flowering in June and July. The stalks rise about three feet in height, are erect, and almost destitute of prickles. The foliage resembles that of the *centifolia*; but the leaflets are not so large, scarcely tomentose below, and subacute. The flowers also are less doubled; the petals large, widely spread open, of a deep, rich crimson colour, fragrant, and displaying an abundance of yellow anthers, on thread-like filaments; with the papillary stigmas of numerous, connected, villose styles, rising from the germen. The petals of the unblown buds are the parts medicinally used. They are cultivated in abundance in the neighbourhood of London for medicinal purposes.

Qualities.—The odour of this rose is less fragrant than that of the former species; but it is improved by drying: the taste is pleasantly bitter and austere. Water at 212° extracts

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1 Illustris mulier mihi asserebat, ex rosarum olfactu se fœcum alvinarum odorem percipere.—*Plenck, Icones,* &c. *cent.* iv.

both its odour and taste; and the infusion strikes a black with sulphate of iron, and also forms a precipitate of a dark colour with sulphate of zinc.

Medical properties and uses.—The red rose is astringent and tonic. It forms an elegant and useful vehicle for the exhibition of mineral acids, nitrate of potassa, and other neutral salts in hæmorrhages, and many other diseases. (See the Preparations of it.)

Officinal preparations.—*Confectio Rosæ Gallicæ*, L. E. D. *Infusum Rosæ compositum*, L. E. D. *Mel Rosæ*, L. D. *Syrupus Rosæ*, E.

3. ROSA CANINA.[1]

Officinal. ROSA CANINA, *Lond.* ROSÆ CANINÆ FRUCTUS, *Edin. Dub.* The pulp of the Dog-rose fruit, or Hep.

Syn. Le fruit d'Eglantier de Chien (*F.*), Die frucht der Wilden rose Hagebutten (*G.*), Le polpa di fruti di Rosa canina (*I.*).

This species is a common but beautiful ornament of our hedgerows, flowering in June, and exhaling a very fragrant perfume. It rises to the height of eight or ten feet; has a smooth stem; with two alternate, compressed conical-hooked, bright red, internodial prickles; and elongated branches spreading from the upright. The leaves are pinnate, composed of seven ovate, pointed, inodorous leaflets, naked and smooth on both sides, but the upper shining, and of a deeper green than the under. The petioles are pubescent, prickly, and glandular. The floral peduncles generally form a kind of corymb; but are sometimes solitary and smooth. The calyx is pubescent within, on the margin; the petals are inversely cordate, generally five, of a pale flesh colour, often white, and odorous. The fruit is an ovate, fleshy, smooth, red-berried calyx; with the apex sometimes open, sometimes shut; containing about thirty long angular seeds, embedded among white silky bristles.

Qualities.—The fruit is inodorous, and has a pleasant, sweet, acidulous taste, depending on uncombined citric acid and sugar, which it contains.

Medical properties and uses.—The pulpy part of heps is cooling, but possesses no direct medicinal properties. It is used only for the formation of the confection.[2]

Officinal preparation.—*Confectio Rosæ caninæ*, L.

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[1] Κυνοσβατον Dioscoridis. *Handsrose* (G.), *Hondsroos* (Dutch), *Hybentorn* (Dan.), *Nieupon* (Swed.), *Rosa Sylvestre* (S.), *Rosa brava* (Port.), *Schippownich* (Russ.), *Shora polna* (Pol.), *Gul* (Tartar), *Foo son* (Japan.).

[2] The confection is sometimes brought to table as a sweetmeat on the Continent; and the leaves of the plant are drunk by the Tartars and the Russians in Siberia instead of tea. The Russians of the Volga prepare a spirit from the flowers.—*Lin. Trans.* vol. xii. part i. p. 227.

ROSMARINUS. *Spec. Plant. Willd.* i. 126.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. ord.* Labiatæ.

G. 62. *Corolla* unequal, with the upper lip two-parted. *Filaments* long, curved, simple, with a tooth.

Species 1. R. *officinalis.*[1] Officinal Rosemary. *Med. Bot. 3d edit.* 329. *Sibthorp, Flora Græca, t.* 14.

Officinal. ROSMARINUS, *Lond.* ROSMARINI OFFICINALIS CACUMINA, *Edin. Dub.* Rosemary tops.

Syn. Romarin (*F.*), Rosmarin (*G., Dutch, Dan., Swed.*), Romarino (*I.*), Romero (*S.*), Rosmaninho, Alcerim (*Port.*), Klil (*Arab.*), Yong tsao (*Chin.*).

This plant is a native of the south of Europe, Greece, and Barbary; but has been long cultivated in Britain, where it flowers in April and May. It is an evergreen, erect, very branching shrub, rising about four feet in height; the branches thickly covered with leaves, and the smaller ones four-cornered and downy. The leaves are opposite, almost sessile; more than an inch in length and one sixth of an inch broad; linear, obtuse, entire, with the margin turned back; of a dark green colour, smooth, and shining, on the upper side; woolly, veined, and of a silvery hue, on the under. The flowers, which are placed on little axillary, opposite, leafy branches, are axillary and terminal, erect, on short stalks. The calyx is bell-shaped, bilabiate, villous; the upper lip entire; the under cloven into two pointed segments. The corolla is ringent, downy, pale blue, variegated with purple and white; the tube longer than the calyx, a little compressed; the upper lip erect and bifid; the lower cleft into three segments; the middle one larger, concave, and notched. The stamens are longer than the upper lip, arched, furnished with a tooth above the base; aud supporting an oblong, blue, terminal anther. The style is the length of the stamens, thread-like, arched, and terminated by a simple sharp stigma. The seeds are four, oblong, and lodged in the bottom of the calyx.

Qualities.—Both the leaves and flowers have a grateful aromatic odour; and a bitterish, warm, pungent taste, depending on a volatile oil, which appears to be combined with camphor: Vide *Ol. Rosmarini.* Alcohol extracts its virtues completely; but they are only partially given out to water. By distillation with water, its volatile oil is obtained. The leaves afford the greatest quantity; the flowers the smallest.

Medical properties and uses.—Rosemary is stimulant, and, according to some, emmenagogue.[2] It has been given in the form of infusion in nervous headache, hysteria, and chlorosis;

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[1] Διβανωτις Dioscoridis.

[2] *Bergius, Mat. Med. à Regno Veget.* p. 21.

but it is now scarcely ever prescribed, unless as an odorous adjunct to sternutatory powders. The dose in substance may be from grs. x. to ℈ij.; and from ℥j. to ℥jss. of the infusion.

Officinal preparations.—*Oleum Rosmarini,* L. E. D. *Spiritus Rosmarini,* L. E. D.

RUBIA. *Spec. Plant. Willd.* i. 603.

Cl. 1. *Ord.* 1. Tetrandria Monogynia. *Nat. ord.* Rubiaceæ.

G. 187. *Corolla* of one petal, bell-shaped. *Berries* two, one-seeded.

Species 1. R. *tinctorum.*[1] Dyers' Madder. *Med. Bot. 3d. edit.* 173. *t.* 67.

Officinal. RUBIÆ TINCTORUM RADIX, *Edin. Dub.* The root of Dyers' Madder.

Syn. Garance (*F.*), Krappwurzel, Færberrothe (*G.*), Mee (*Dutch*), Krap (*Dan. Swed.*), Radiche di Robbia o Garanza (*I.*), Rudia (*S.*), Ruida (*Port.*), Munjith (*H.*), Manjttittie (*Tam.*), Marzana (*Pol.*), Mariona (*Russ.*), Kermesa Buja (*Turk.*).

This plant is a perennial, with annual stems. It is a native of the south of Europe, the Levant, and Africa, and has been cultivated to a very great extent for upwards of 300 years in Zealand: it flowers in June.[2] The root is composed of many long, thick, succulent fibres, about the thickness of a man's finger, united at the top in a head, from which go off many side-roots, extending under the surface of the ground, and throwing up shoots by which the plant may be propagated. The stems are quadrangular, jointed, procumbent, and furnished with rough, short, hooked points, by which they are supported on the neighbouring plants. The leaves, which are in whorls of four or five, are elliptical, pointed, rough, and ciliated, about three inches long, nearly one broad in the middle, and having the midribs armed with the same kind of spines as on the stems. The branches bearing the flowers spring from the joints of the stems. The flowers are small, terminal, with a campanulate, yellow corolla, cut into four oval segments; the filaments short, supporting simple erect anthers; and the germen is inferior and double, crowned with a slender style bearing two globular stigmas, and becoming two round black berries.

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[1] Ερευθοδανον Dioscoridis.

[2] As madder is an article of great national importance as a dye-stuff, many attempts have been made to cultivate it in this country, but without success, the Dutch madder being both better and cheaper than ours. That it can be grown to great perfection in this country is certain, and the effort to introduce its culture should not be dropped. The best comes from Zealand; to which Britain alone is said to have paid 200,000*l.* annually for madder.—*Bancroft on Permanent Colours,* 2d edit. vol. ii. p. 222.

Madder root is dug up for use in the third summer of its growth. It is then dried gradually in a stove built in the form of a tower, containing several floors: and from the uppermost it is progressively removed to the lowest; after which it is threshed to remove the cuticle, and then dried completely in a kiln. When perfectly dried it is pounded, and finally packed in barrels for the market. There are three descriptions of this powder. The first pounding separates and reduces to a powder the fibrillæ and the skins of the larger roots only, which is sold at a low price under the name of *mull*; a second pounding separates one third of the remaining parts of the large roots, and is sold under the name of *gemcens*; and a third pounding forms into a powder the pure bright residue of the roots, which is the best, and is simply called *crop* madder.[1] In the Levant the root is termed *Alizari.*

Qualities.—Madder has an unpleasant but not strong odour; and a bitter, slightly austere taste. It attracts the moisture of a damp atmosphere, and is injured by it. To water, alcohol, and volatile oils, at a temperature of 60°, it imparts a red colour; but to water at 212° the colour imparted has a deep tinge of brown. Its principal constituent is extractive, which is precipitated, by a solution of alum, brownish red; by the alkaline carbonates and lime-water, blood-red or lake; and by acetate of lead, brown.[2] The taste and odour of the madder are imparted to water, ether, and alcohol by infusion. The colouring principles of madder are various; one of them is peculiar. When the madder is digested in ether and evaporated, it has a brown hue, and when sublimed in a gentle heat, it condenses in small, red, acicular, diaphanous, flexible crystals, which are insipid and inodorous, and give to boiling water a rose-red colour. They are also soluble in 210 parts of alcohol, and 160 of ether, at 60° Fahr.: they neutralize alkaline leys, to which they impart a violet colour. Robiquet and Colin have named this principle *alizarine:* it consists of 18 parts of carbon, 20 of hydrogen, and 62 of oxgen, in 100 parts.

Medical properties and uses.—Madder is usually regarded as emmenagogue, and was formerly much relied on in chlorosis, and scanty and difficult menstruation. It has also been recommended in jaundice, and the atrophy of infants: but its efficacy in any disease is extremely problematical. Its colouring matter, however, is carried into the circulation, tinges the

[1] *Bancroft,* l. c.

[2] *Annales de Chimie,* iv. 104.

urine and the milk a blood-red colour, and is deposited in the bones.[1]

The dose of madder may be from grs. xv. to ℈ j., united with sulphate of potassa, and given three or four times a day.

RUMEX. *Spec. Plant. Willd.* ii. 249.

Cl. 6. *Ord.* 2. Hexandria Digynia. *Nat. ord.* Polygonaceæ.

G. 699. *Calyx* three-leaved. *Petals* three, converging. *Seed* one, three-sided.

* * *Hermaphrodites: with naked valves, or not marked with a grain.*

Species 18. R. *aquaticus.* Great Water-dock. *Smith, Flora Brit.* 394. *Med. Bot. 3d edit. t.* 299.

* * * *With declinous flowers.*

Species 31. R. *acetosa.* Common Sorrel. *Med. Bot. 3d edit. t.* 230. *Smith, Flora Brit.* 396.

1. RUMEX AQUATICUS.[2]

Officinal. ——; RADIX, *Dub.* The root of Water-dock.

Syn. La Patience aquatique (*F.*), Wasser Ampfer (*G.*), Waterpatich (*Dutch*), Rabaca major (*Port.*), Wodanoi Schawel (*Russ.*), Kong-ŏ-lĭk (*Esquimaux*).

Water-dock is an indigenous perennial plant, growing in ditches and on the banks of rivers; flowering in July and August. The root is thick. The stem rises about five feet in height, straight, furrowed, and smooth. The leaves are almost glaucous, lanceolate, and pointed, and the lower ones obcordate at the base. The flowers are in approximate whorls. They are nodding, on capillary pedicles, thickened at the apex. The valves are large, ovate, veined, entire, sometimes a little toothed, and all marked with a small, linear, often obscure grain: the seed is large.

Qualities.—The root is nearly inodorous, and has a very austere taste. It yields its virtues to water.

Medical properties and uses.—Water-dock root is powerfully astringent. It was formerly celebrated, under the name *Herba Britannica*, as a remedy for scurvy, and some cutaneous affections. It is now scarcely ever employed, although it undoubtedly possesses considerable powers in scurvy. Linnæus, in a letter to Dr. Lind, describing the scurvy of the Laplanders, asserts, that it is the only remedy which proved efficacious in that disease when "the ulcers are healed, and the patient is attacked with asthma."[3] I have ascertained that a decoction of one ounce of the sliced root of the common

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[1] Vide *Phil. Trans.* xxxix. 287—299. The leaves of the plant are said to tinge the milk of cows reddish, when eaten by them.

[2] Βρεταννικὴ ἢ βεττονικη Dioscoridis.

[3] *Correspondence of Linnæus,* vol. ii. p. 476.

dock, rumex *obtusifolius*, in a pint of water, is extremely efficacious in obstinate ichthyosis. In a full dose, about two ounces of the decoction, it purges freely; but at the same time improves the tone of the stomach.

2. RUMEX ACETOSA.

Officinal. RUMEX, *Lond.*[1] RUMISIS ACETOSÆ FOLIA, *Edin.* Common Sorrel leaves.

Syn. Oseille ordinaire (*F.*), Sauer Ampfer (*G.*), Veldznuring (*Belg.*), Surampcr (*Dan.*), Angsyra (*Swed.*), Szszaw (*Polish*), Acetosa (*I.*), Azedera (*S.*), Azedas (*Portug.*).

This is an indigenous perennial plant, common in pastures, and flowering in June. The stem is round, striated, and leafy, and rises from one to two feet in height. The leaves are oblong, ovate, and arrow-shaped; the radical ones petiolate and obtuse; and those of the stem sessile, amplexicaule, pointed, and a little rolled back. The flowers are diœcious, in branched panicles, and arranged in half whorls: the calyx and corolla small: the stamens very short, bearing large yellow anthers, and the styles short, with large, crimson, bearded stigmas. The valves are ovate, entire, and graniferous.

Qualities.—Sorrel leaves are inodorous, and have a grateful, austere, acidulous taste, depending on the presence of binoxalate of potassa and tartaric acid, which they contain.

Medical properties and uses.—These leaves are refrigerant and diuretic. Their expressed juice diluted with water, or a decoction of them in whey, affords a useful drink in cases of inflammatory fever; and eating them in large quantities daily as a salad, may prove serviceable in some cutaneous affections. In France, the plant is cultivated for the use of the table; and Dr. Clarke mentions that the natives of *Wermeland*, on the confines of Sweden, make it into bread in seasons of scarcity, and that it is not unsalutary.[2]

RUTA. *Spec. Plant. Willd.* ii. 542.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Rutaceæ.

G. 827. *Calyx* five-parted. *Petals* concave. *Receptacle* surrounded by ten melliferous points. *Capsule* lobed.

Species 1. R. *graveolens.*[3] Common Rue. *Med. Bot. 3d edit.* 437. *t.* 174.

Officinal. RUTA, *Lond.* RUTÆ GRAVEOLENTIS HERBA, *Edin. Dub.* The leaves and herbaceous part of Rue.

Syn. Ruë sauvage (*F.*), Raute, Garten raute (G.), Ruite (*Dutch*), Rude (*Dan.*), Winruta (*Swed.*), Ruta (*I.*), Ruta de derpesado (*S.*), Ruda (*Port.*), Ruda (*Russ.*), Arooda (*Tam., Cyng.*), Sadsah (*Malay*), Sendib (*Arab.*), Saturi (*H.*), Inghoo (*Javanese*).

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1 It is not easy to comprehend why the London College has adopted the term of the genus for the officinal appellation of this species.

2 *Travels, &c.* part iii. p. 90. 4to. Lond. 1823.

3 'Ρυτη Πηλανον Dioscoridis.

Rue is an evergreen perennial, a native of the south of Europe, but much cultivated in our gardens, flowering in June and September. It rises to the height of two or three feet, shrubby and branching, with the lower part of the stems ligneous, and covered with a rough, striated, grey bark; but the upper branches are smooth, and of a pale green colour. The leaves are doubly pinnate; the pinnæ distant; and the leaflets obovate, sessile, decurrent, and very obscurely crenate, with the terminal one generally notched; the surface punctured, the texture rather thick, and the colour bluish green or glaucous. The flowers are produced in terminal branched corymbs on subdividing peduncles. The flower which opens first has a five-parted calyx, and a five-petalled corolla; but the others have the calyx four-parted only, and a four-petalled corolla. The petals are concave, wrinkled at the edge, of a pale greenish yellow colour, and very much spread: the stamens are awl-shaped, the length of the petals, and bearing small, yellow, quadrangular anthers.[1] The germen is large, oval, punctured, deep green, with crucial furrows, and crowned with a short style and simple stigma; and the seeds are angular, rough, and blackish.

Qualities.—Rue leaves have a powerful unpleasant odour, and a hot, bitter, nauseous taste. In the recent state, the leaves possess so much acrimony as to inflame and blister the skin; but much of this is dissipated in drying. In distillation with water, they yield a pungent volatile oil, on which their virtues chiefly depend; consequently, decoction is a bad form of preparation of rue.

Medical properties and uses.—Rue is stimulant and antispasmodic, and is supposed to possess emmenagogue powers. It was in high estimation so early as the time of Hippocrates, who frequently ordered it in female complaints.[2] In modern practice it is chiefly used in hysteria and flatulant colic. I have found a strong infusion of it, exhibited per anum, of great service in relieving the convulsions of infants arising from flatulence and other intestinal irritations. It may, however, inflame the mucous coat of the intestines, and therefore should be used with caution. The dose of the powdered leaves is from grs. xv. to ℈ ij., given twice or three times a day.

Officinal preparations.—*Oleum Rutæ*, D. *Extractum Rutæ graveolentis*, E. D.

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1 These stamens display in a striking manner the spontaneous motions which take place in some plants. They are very stiff, and cannot be disturbed from the posture in which they happen to be; but nevertheless they rise, by a spontaneous movement, one or two at a time, and lean over the stigma till the pollen be shed, when they fall back again, and give place to others.

2 *De Morbis Mulier.*

SABADILLA. Vide *Helonias officinalis*.[1]

SABINÆ FOLIA. Vide *Juniperus*.

SACCHARUM. *Spec. Plant. Willd.* i. 122.

Cl. 3. *Ord.* 2. Triandria Digynia. *Nat. ord.* Gramineacæ.

G. 122. *Calyx* two-valved, involucred, with a long lanugo. *Corolla* two-valved.

Species 4. S. *officinarum*.[2] Common Sugar-cane. *Sloane's Jamaica*, i. 101. *t.* 66. *Phil. Trans.* lxix. 207—278. *t.* 3.

Officinal. SACCHARI FÆX. SACCHARUM, *Lond.* SACCHARUM, a. *non purificatum;* b. *purificatum;* c. *syrupus empyreumaticus*, *Edin.* SACCHARUM PURIFICATUM; SACCHARUM NON PURIFICATUM, EJUSDEMQUE SYRUPUS EMPYREUMATICUS (Molasses), *Dub.* Molasses. Unrefined Sugar. Refined Sugar.

Syn. Sucre, Sucre-pur (*F.*), Zucher, Weisser Zucher (*G.*), Suiker (*Dutch*), Sukker (*Dan.*), Socker (*Swed.*), Zucchero brutto, Zucchero in pane, Melassa (*I.*), Azucar, Atriaca (*S.*), Assucar (*Port.*), Shukhir (*Arab.*), Chenee (*H.*), Sakkari (*San.*), Sakkarei (*Tam.*), Shukker (*Pers.*), Soola (*Malay*).

The common sugar-cane, Arundo *saccharifera*, is a native of both the East and West Indies. It is cultivated in Persia, and very abundantly in the West Indies. There are two varieties of the officinal sugar-canes: the Creole and the Otaheite. They are distinguished chiefly by the colour of the leaves; those of the former being much deeper than those of the latter. The root is jointed, and sends up several jointed stems, which rise in general to the height of eight or ten feet. A leaf springs from each joint, and the base of it embraces the stem to the next joint above its insertion, before it expands. From this point each leaf is about three or four feet long, and comparatively narrow, like a blade of grass; with the midrib broad, and prominent on the under side, and the edges thin and sharply toothed. The flowers are whitish, in terminal panicles, two or three feet in length, and composed of subdivided spikes, with long flexuose down or lanugo, which encloses the flowers and hides them from the sight. The seed is oblong, pointed, and ripens in the valves of the flowers.

Although the sugar-cane is undoubtedly a native of the American continent and its islands, yet the culture of it, and the art of making sugar, were carried from Spain to the Canary Islands[3], and thence extended, about the end of the

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[1] *Ed. Phil. Journ.*

[2] Cannamelle (*F.*), Zuckerrohr (*G.*), Suikerriet (*Dutch*), Cannamele (*I.*), Cana de azucar (*S.*), Quasab (*Arab.*), Can che (*Chin.*).

[3] At one time sugar was the staple commodity of Madeira, although there is now one sugar-mill only on the island; but the sugar is uncommonly fine, and has an agreable odour, not unlike that of violets. Sprengel says, the first notice of the sugar-cane is found in the Itinerary of Abusaida, in which it is stated that it grows at Siraf; and Abulfed says it grows spontaneously at Almansura, in India. Ebu Alvan first described the mode of collecting and preparing the juice.

fifteenth century, to the West Indies and the Brazils; the former of which supplies the greater part of the consumption of Europe[1], a small proportion only being brought from the East Indies. The quantity of sugar yielded by the plant is varied by climate: thus, the Otaheitean cane contains one third more crystallizable matter than the cane of any other place.[2] The average quantity is from six to fifteen per cent.

In the West Indies the plant is propagated by cuttings of the stalk taken from near its top, and laid horizontally in the ground. It requires a rich permeable soil; and from fourteen to seventeen months before it ripens: good land will furnish five crops of shoots, without transplanting. The canes are cut for the purpose of making sugar between the sixth and thirteenth month of their growth, when the stems have acquired from seven to ten feet in height, a proportionable size, and the cuticle appears smooth, dry, and brittle. This generally happens in the months of February, March, and April. As soon as they are cut, the canes are stripped of their leaves, and immediately crushed between iron rollers, to express the juice, which is received into large leaden vessels, called *receivers*, whence it is conveyed into a large copper vessel, named the *clarifier*, where it is mixed with lime, in the proportion of one pint to 100 gallons of juice, and heated to the temperature of 140°.[3] A thick scum soon forms on the top, from under which the clear liquor is drawn off by a cock into a large copper boiler, where it is boiled till the bulk of the liquor is very considerably diminished. The boiling is successively repeated in four other coppers, progressively smaller; and from the last, which is called the *teache*, it is conveyed into shallow wooden coolers, where it grains, and the concreted mass separates from the uncrystallizable matter, or molasses. This mass is then put into empty hogsheads, having holes in the bottom, through each of which the stalk of a plantain-leaf is thrust; and when the molasses has drained off the process is finished. In this state the sugar is brought home, under the name of *raw* or *muscovado* sugar. In Europe, however, sugar undergoes another process for its purification. It is coarsely ground, dissolved in lime-water,

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[1] The average importation into England and Scotland, between 1787 and 1790, amounted annually to 1,952,262 cwt.—*Mosley's Hist. of Sugar*, p. 154.

[2] The Batavian, which is less productive, is undoubtedly a distinct species. The foliage is purple, and very broad.

[3] The lime extricates carbonic acid from the juice, and forms, with the *herbaceous* or feculent matter, an insoluble compound, which rises to the surface, and forms the scum.

and clarified with bullocks' blood; then boiled down to a proper consistency, the impurities being skimmed off as they rise, and poured into conical earthen vessels, where it is allowed to grain. The point of the cone is perforated; and the base covered with moist clay, the moisture of which percolates the sugar, and runs off through the perforated apex, which is placed undermost, carrying with it any uncrystallized impure syrup. In this state it is called *loaf* sugar; and requires a second purification before it is considered as completely *refined* sugar. A new method of purification was introduced by Messrs. Taylor and Howard. It consists in boiling the sugar with steam, at a low temperature, and in vacuo.

Sugar was originally brought from Asia, about the period of the crusades, but was for a long time only employed as a medicine.

Qualities.—Pure *raw* or *muscovado* sugar is odorous, and sweet to the taste. It is in concreted masses, consisting of small, dry, sparkling, irregular crystals of a yellowish brown colour. *Refined sugar* is inodorous, and sweet to the taste. Its colour is pure white; and the mass or loaf in which it is concreted should be hard, extremely brittle, pulverulent, and persistent in the air. One hundred parts of sugar in its ordinary state contain, according to Berzelius, 5·3 of water; and it requires its own weight only of water at 48° for its solution. When united at a higher temperature with a smaller quantity of water, it remains dissolved, forming syrup. Four parts of boiling alcohol dissolve one part of sugar; but by rest a moiety of the sugar again separates in crystals. Oils also readily combine with it, and the mixture is miscible with water. Lime and the fixed alkalies unite with sugar, and form compounds without any sweetness of taste. The concentrated strong acids dissolve and decompose sugar, the nitric converting it into oxalic acid, but the weaker simply dissolve it; and the alkaline and earthy hydrosulphurets, sulphurets, and phosphorets, decompose it, and resolve it into a substance resembling gum.[1] "When sugar is boiled," says Vogel, "with peroxide of mercury and acetate of copper, these salts are converted into protoxides; bichloride of mercury is converted into calomel: and sulphate of copper and nitrate of mercury are reduced to a metallic state. But sugar does not decompose the salts of iron, zinc, tin, and manganese." Its ultimate constituents, according to the experiments of Lavoisier, are sixty-four oxygen, twenty-

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[1] *Rollo on Diabetes*, 452. *Thomson's Chymistry*, 4th edit. vol. iv. 660.

eight carbon, and eight hydrogen in 100 parts[1]; but according to Thénard and Gay Lussac, the proportions are, oxygen 50·63, carbon 42·47, hydrogen 6·90, with which the last analysis of Berzelius nearly coincides. According to Dr. Prout, the best loaf sugar consists of 42·85 of carbon, and 57·15 of oxygen and hydrogen in the proportion for forming water: or 1 proportion of carbon = 6·12 + 1 of water = 9, making the equivalent 15·12.

Molasses has a peculiar odour, and a sweet, empyreumatic taste. It is of a brown or black colour, thick, and viscid; and is constituted chiefly of the uncrystallizable part of the juice of the sugar-cane, which Prout has denominated liquid sugar, combined with saline, acid, and other vegetable matters. It is more soluble in alcohol than sugar.

Medical properties and uses.—Raw sugar and molasses are laxative; and refined sugar externally applied is escharotic. All the kinds are extremely nutrient, and more generally used as articles of diet than for medicinal purposes; except it be to cover the taste of nauseous drugs. Sugar, however, is said to be a preventive of worms, and to prove useful in scurvy; but it is hurtful to those of bilious, hypochondriacal, and dyspeptic habits. Milk boiled with fine sugar will keep good for a considerable time. It is said to be an antidote to the poison of verdigris, but as it does not decompose the salts of copper except at a boiling temperature it cannot be regarded as an antidote of cupreous poisons. It requires to be given in large quantities, both in the solid form and in solution of water. It appears to act chymically on the poison, and also by increasing the peristaltic action of the bowels.[2]

Officinal preparations.—*Syrupi omnes,* L. E. D. *Trochisci omnes,* E. *Confectiones omnes,* L.

SAGAPENUM. *Lond. Edin.* GUMMI RESINA, *Dub.* Sagapenum.

Syn. Sagapenum (*F.*), Sagapengummi (*G.*), Sagapeno (*I.*), Sugbeenuj (*Arab.*), Kundel (*H., Sans.*).

This gum resin, which is brought to this country from Smyrna, Aleppo, and Alexandria, is the concrete juice of an unknown Persian plant. Dioscorides mentioned it as the juice of a ferula growing in Media[3]; and nothing more is known of its source at this day; although Willdenow supposes it to be the *ferula Persica.*[4]

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1 A sugar in every respect resembling common sugar is obtained from the maple.

2 Vide *Traité des Poisons,* &c. Par M. P. Orfila, tom. i. p. 281.

3 *Dioscorides,* lib. 3. c. 95. (Σαγαπηνον.)

4 This plant was fully described by Dr. Hope, as the plant which yields the assafœtida, which, however, is the produce of another species. See *Phil. Trans.* lxxv. 36. t. 3, 4.

Qualities.—Sagapenum has an alliaceous odour, and a hot, acrid, bitterish taste, not unlike that of assafœtida, only weaker. It is in agglutinated drops or masses, of an olive or brownish yellow colour, slightly translucent, and breaking with a horny fracture. It softens, and is tenacious between the fingers; melts at a low heat, and burns with a crackling noise and white flame, giving out abundance of smoke, and leaving behind a light spongy charcoal. Water and strong alcohol dissolve it partially; but it is almost completely soluble in proof spirit. In distillation with water it yields a little volatile oil, and impregnates the water strongly with its flavour. Its constituents are 33·34 of gum, 54·26 of resin, 0·40 acidulous malate of lime, 10·20 of volatile oil.

Medical properties and uses.—This gum-resin is antispasmodic and emmenagogue; and externally discutient. It is sometimes employed in hysteria and chlorosis, and other cases in which assafœtida has been found serviceable; but it is much inferior in its powers to that gum-resin. It is usually given in substance, in doses of from grs. vj. to grs. xij., made into pills.

Officinal preparations.—*Pilulæ Galbani compositæ,* L.D. *Conserva Rutæ,* D. *Confectio Rutæ,* L.

SAGUS. *Spec. Plant. Willd.* viii. 403.
Cl. 21. *Ord.* 6. Monœcia Hexandria. *Nat. Ord.* Palmæ.
G. 1683. *Spathe* universal, univalve. *Spadix* ramose.
Male. *Calyx* triphyllus. *Corolla* O. *Filaments* dilated.
Female. *Calyx* triphyllus, with twin bifid leaflets. *Corolla* O. *Style* very short. *Stigma* simple. *Nut* tessilated, one seeded.
Species 2. S. *Rumphii.* Sago Palm. *Rumph. Amboy.* 1. *p.* 72. *t.* 17, 18. *Loudon's Encyclopædia of Plants, p.* 789.
Officinal. SAGO, *Lond.* Sago.

Syn. Sagou (*F.*), Sago (*G.*), Sago (*I.*), Sagu (*S.*).

Although this farinaceous substance is designated by the London College as the production of the Sagus *Rumphii,* yet it is prepared from other *Palms* and *Cycadeæ.* The greater part, however, of the sago of commerce is procured from the S. *Rumphii.* It is a native of the Moluccas, Borneo, the Celebes, and is cultivated in part of New Guinea. It flourishes best in low moist situations, and seldom exceeds thirty feet in height. The trunk is thick, erect, and surrounded at the summit with a beautiful crown of large pinnate leaves, curving gracefully downwards. The flowers are in long ramose spadices: the fruit is a globular nut, covered with a chequered imbricated coat, and containing a single seed.

When the tree has attained maturity, the stem consists chiefly of spongy medullary matter, surrounded with a thin shell or cortex. As absorption of the interior takes place after the appearance of the fruit, and the stem becomes hollow, the tree is felled before this commences, and cut into billets of six or seven feet long, which are split to facilitate the extraction of the pith. It is at first in the state of a coarse powder, which is mixed with water in a trough, having a sieve at the end, through which the mixture passes into vessels, where the fecula is allowed to subside. It is then strained off, and dried either into a kind of meal, or formed into cakes, or made into a paste and granulated, as it is usually found in commerce. Crawford, who has given the foregoing account of its manufacture, says that the finest is the production of the eastern coast of Sumatra. What is termed *Pearl* Sago, from its pearl lustre, is made by the Chinese of Malacca.[1]

M. Planche has examined chemically the nature of thi description of fecula, of which he states there are six varieties 1. The *Sago of the Maldives* is the growth of the island of Mali It is in roundish grains, exteriorly of a brownish-grey colou passing into white. Macerated for 24 hours it absorbs te parts of water, and doubles its bulk; the filtered fluid is no affected by litmus, iodine, galls, or nitrate of silver, and scarcely by diacetate of lead; but when evaporated a straw-yellow extract is procured, slightly saline, and yielding a minute portion of chloride of sodium when boiled with alcohol. 2. The *Sago of Sumatra*[2] is in round white and pale yellow grains, and exhales a musk odour, which disappears on washing it. With water it is affected in the same manner as the former variety, but the extract yields a larger proportion of chloride of sodium. 3. The *Sago of New Guinea* is the production of a Cycas, which grows in the island of Waigiou: the grains are exteriorly of a brick red colour, passing to a dirty white. The water in which it is macerated yields also traces of chloride of sodium. 4. The *Malacca Sago* constitutes three of the varieties of M. Planche. The first, which is in irregular roundish grains of a fawn colour, passing into grey, is the production of the Sagus Rhumphii, and is prepared chiefly in the island of Borneo. Five hundred grains of it absorbed 544 grains of water in doubling its bulk. The water in which it was macerated precipitated chloride of silver when tested with the nitrate, and the extract consequently yielded more chloride of sodium than the other varieties. The second or *rose*-coloured variety of this sago resembles the former: the third or *white* variety differs in yielding to the water of maceration a fecula, so that it affords a magni-

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[1] One tree will yield nearly 600 lbs. of sago.

[2] It is never found in European markets.

ficent blue with iodine, and is rendered slightly turbid, and gives a precipitate with infusion of galls.[1]

Although sago is insoluble in cold water, yet, when long boiled with it, it softens, becomes transparent, and at length forms a gelatinous solution, having all the chemical characters of starch.

Sago has no medicinal properties, but, like the other varieties of starch, it forms a useful, light nutriment for the sick and the convalescent. A table spoonful to a pint of water forms a proper solution, which may be sweetened with sugar, or rendered more palatable by the addition of lemon juice or wine, according to circumstances.

SALIX. *Spec. Plant. Willd.* iv. 703.

Cl. 22. *Ord.* 2. Diœcia Diandria. *Nat. ord.* Salicineæ.

G. 1756. *Male. Amentum* cylindrical. *Calyx* a scale. *Corolla* none. *Gland of the base* nectariferous.

——— *Female. Amentum* cylindrical. *Calyx* a scale. *Corolla* none. *Style* bifid. *Capsule* one-celled, two-valved. *Seeds* downy.

* *With smooth serrated leaves.*

Species 10. S. *fragilis.* Crack Willow. *Smith, Flora Brit.* 1051. *Med. Bot. 3d edit.* 13. *t.* 8. *Hoffman, Sal.* ii. 9. *t.* 31.

* * * *With villose leaves.*

Species 33. S. *alba.* White Willow. *Smith, Flora Brit.* 1071. *Hoffman, Sal.* i. 41. *t.* 7, 8.

Species 101. S. *caprea.* Great Round-leaved Sallow. *Smith, Flora Brit.* 1067. *Hoffman, Sal.* i. 25. *t.* 3. *f.* 1.

1. SALIX FRAGILIS.

Officinal. —— CORTEX, *Dub.* Bark of the Crack Willow.

Syn. Ecorce de Saule (*F.*), Weidenrinde (*G.*), Corteccia di Salcio (*I.*), Corteza de sauce (*S.*).

This species of willow is indigenous, growing upon the banks of rivers, and flowering in April and May. It grows to a considerable height, sending off upright branches; which are covered with an even brownish yellow bark, and are very fragile at the base. The leaves are petiolate, from three to five inches in length, lanceolate, pointed, obtusely serrated, inflected, and glandular; smooth on both surfaces, shining on the upper; and, in the younger ones, ciliated at the apex. There are sometimes no stipules; but, when present, they are rounded and obscurely toothed. The male catkin is pale, cylindrical, rather lax, with ovate downy scales. The nectary is composed of two yellow glandular scales; the larger between the stamen and the receptacle, and the smaller

[1] *Journal de Pharmacie.—Mars,* 1837. p. 115.

between the stamen and the scale. The stamens are two, filiform, and smooth. The female catkin resembles the male; with the germen egg-shaped, supporting two bifid erect stigmas. The capsule is ovate, and contains many small seeds. The bark requires to be dried in an oven moderately heated.

Qualities.—The dried bark is inodorous, bitter, and austere.

2. SALIX ALBA.[1]

Officinal. —— CORTEX, *Dub.* Willow Bark.

Syn. Saule (*F.*), Weide (*G.*), Wilg (*Dutch*), Piil (*Dan.*), Pihl (*Swed.*), Koro Wierzbowa (*Pol.*), Salice (*I.*), Sauce (*S.*). Salgueiro (*Port.*).

The white willow is indigenous, growing in woods and moist places, and flowering in April and May. It is a large tree, with a cracked bark, and furnished with many round spreading branches; the younger of which are silky. The leaves are alternate, on short petioles, lanceolate, pointed, acutely and regularly serrated, with the lower serratures remote and glandular; pubescent on both sides, and silky beneath: the younger ones are altogether silvery and convoluted. There are no stipules. The catkins are terminal, cylindrical, elongated, slender, and many-flowered, with elliptical, lanceolate, brown, pubescent scales. The stamens are yellow, and a little longer than the scales: the style is short; and the stigmas bipartite and thick. The capsules are nearly sessile, ovate, brownish, and smooth.

The bark of this species is easily separated all the summer. It has been used for tanning leather; and the inner part of it affords the miserable inhabitants of Kamschatka a substitute for bread.

Qualities.—The same as those of the former species.

3. SALIX CAPREA.[2]

Officinal. —— CORTEX, *Dub.* Willow Bark.

This species of willow is indigenous, very common in woods, flowering in April. It is a middling-sized tree, with the branches round, even, shining, and brownish, and the shoots pubescent. The leaves are alternate, petiolate, and varying in shape, being sometimes elliptical or roundish, pointed, large, undulated, waved, or serrated; smooth and dark green on the upper surface, and densely tomentose and veined on the under. The stipules are crescent-shaped or roundish, recurved, waved, and tomentose. The petioles are linear, and

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[1] Ἰτέα λευκὴ Theophrasti.

[2] *Siler* Virgilii.

densely villose. The catkins appear before the leaves, are ovate, thick, many-flowered, with obovate, very hairy scales. The stamens are yellow: the stigmas nearly sessile, undivided, but at last occasionally cleft. The capsules are pedicelled, ovate, bellied at the base, and downy.

Qualities.—The bark of this species, like that of the two former, is inodorous, bitterish, and astringent.

The bark of the white willow only has been chymically examined; but as the other two species agree with it in their sensible qualities, it is probable that they agree also in other respects. Water extracts its virtues, and affords a decoction of a reddish colour, which is precipitated by a solution of isinglass, the carbonates of potassa and of ammonia, and by lime-water, which throws down a precipitate, at first blue, and afterwards buff-coloured: sulphate of iron also produces a dark green precipitate. The watery extract is reddish, brittle, has a bitter taste, and does not deliquesce. Digested in alcohol, this bark affords a greenish yellow tincture, which water renders turbid. When evaporated the extract is of a bright yellow colour, bitter, softens at a moderate heat, and emits an aromatic odour.[1] The constituents of white willow bark, and probably of the two other species also, are tannin, bitter resin, extractive, gluten, and salicina.

Salicina, when pure, is white, in prismatic needle-form crystals, very bitter, and slightly aromatic. 100 parts of water, at 67° Fahr., dissolve 5·6 of salicina: boiling water takes up an unlimited quantity. It is also soluble in alcohol; but not in ether, nor in turpentine. Concentrated sulphuric acid reddens it deeply; nitric and hydrochloric acids dissolve it without any change of colour. It is not precipitated by infusion of galls, acetate of lead, alum, nor tartar emetic. It is composed of 2 proportions of carbon $= 12·24 + 2$ hydrogen $= 2 + 1$ oxygen $= 8$, making the equivalent $=$ 22·24.

Medical properties and uses.—These barks are tonic and astringent. They have been given as substitutes for the cinchona bark; and in some cases intermittents and remittents have yielded to their use.[2] They have also been efficaciously administered in cases of debility, dyspepsia, and pulmonary hæmorrhages, and have apparently been more serviceable in

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1 *Ann. de Chimie*, liv. 290. *Thomson's Chymistry*, 4th edit. vol. v. p. 221.

2 The bark of the white willow was first used by the Rev. Edmund Stone, of Chipping Norton, Oxfordshire. He gave it successfully in doses of one drachm of the powder every hour between the paroxysms, in tertians; and added one fifth of Peruvian bark, to augment its power, in obstinate quartans.—*Phil. Trans.* liii. 195.

phthisis and hectic fever than the cinchona. They may be given either in substance, or in the form of decoction. Of the powdered bark from ℥ss. to ℥j. may be given for a dose, combined with aromatics, myrrh, or the cinchona bark, as circumstances direct.

SALVIA. *Spec. Plant. Willd.* i. 127.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. Ord.* Labiatæ.

G. 63. *Corolla* unequal. *Filaments* affixed transversely to a pedicle.

Species 7. S. *officinalis.*[1] Garden Sage. *Med. Bot. 3d edit.* 352. *t.* 127.

Officinal. SALVIÆ OFFICINALIS FOLIA, *Edin.* The leaves of Sage.

Syn. Sauge (*F.*), Salbei (*G.*), Salei (*Dutch*), Salvie (*Dan.*), Salvia (*Swed.*), Szalwia (*Pol.*), Salvia (*I.*), Salvia (*S.*), Salva (*Port.*), Schalweja (*Russ.*), Sayselley (*Tam.*), Saulbēy (*Pers.*).

The common or officinal sage is a perennial plant, a native of the South of Europe, cultivated abundantly in our gardens, flowering in June. It rises about two feet in height, with a quadrangular, shrubby, branching stem. The younger branches are whitish and downy. The leaves, which stand in pairs on footstalks, are ovato-lanceolate, wrinkled, crenate, and sometimes tinged reddish or purple. The flowers are on long terminal spikes, in six-flowered distant whorls, accompanied with ovate, acute, deciduous bractes. The calyx is striated, purplish on the upper part, and notched into three acute teeth above, and two below; the corolla is tubular and bilabiate, of a beautiful blue, variegated with purple and white; the upper lip obtuse, notched, and concave; the under three-lobed, the lateral lobes bent backwards. The filaments are affixed transversely at their middle to short pedicles, on a moveable axis, and are curved threads bearing a gland on the lower end, and on the upper a yellow oblong anther: the style is long, curved, purple, with a bifid stigma, and rising from the centre of four naked seeds in the bottom of the calyx.

There are many varieties of common sage, but their properties are the same. It is cut when in flower, and hung up in a shady place to dry.

Qualities.—The odour of sage is fragrant; and the taste warm, bitterish, and aromatic: qualities depending on an essential oil, which can be obtained separate in distillation with water. Sulphate of iron strikes a deep black colour with the infusion.

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[1] Ελιλισφακον Dioscoridis.

Medical properties and uses.—Sage is stimulant, carminative, and slightly astringent. The estimation in which it was held by the ancients is sufficiently well known; but it does not support the character it formerly acquired; and "salvia salvatrix naturæ conciliatrix [1]" is very little regarded by the modern practitioner. Infusions of the leaves, if strained before too much of the bitter is extracted, prove very grateful to the stomach, when nausea is troublesome, in febrile complaints; and when drunk cold, they are said to check hectical perspiration [2], and those which frequently attend convalescences. The infusion, either alone or mixed with honey and vinegar, is a well-known gargle in cases of sore throat and relaxation of the uvula. The dose of the pulverized leaves is from grs. xv. to ʒ ss.; or, of an infusion made with ℥ j. of the dried leaves and O j. of boiling water, f ℥ ij. may be taken every three or four hours.

SAMBUCUS. *Spec. Plant. Willd.* i. 1494.

Cl. 5. *Ord.* 3. Pentandria Trigynia. *Nat. ord.* Caprifoliaceæ.

G. 569. *Calyx* five-parted. *Corolla* five-cleft. *Berry* three-seeded.

Species 3. S. *nigra.*[3] Common Elder. *Med. Bot. 3d edit.* 596. *Smith, Flora Brit.* 336. *Eng. Bot.* 476.

Officinal. SAMBUCI FLORES ET OLEUM, *Lond.* SAMBUCI NIGRÆ FLORES; BACCÆ CORTEX, *Edin.* SAMBUCUS; CORTEX INTERIOR, FLORES, BACCÆ, *Dub.* The flowers, berries, and inner bark of Common Elder.

Syn. Sureau ordinaire (*F.*), Fliederblumen (*G.*), Coorteccia, bacche, e fiori di Sambuco (*I.*), Sabuco (*S.*), Uktee (*Arab.*).

The common elder is a very abundant, indigenous, middle-sized shrubby tree, growing commonly in hedges; flowering in June, and ripening its berries in September. It is much branched near the top, and covered with a roughish grey bark. The wood is white, hard, and has a large spongy pith. The leaves are pinnated, composed of five oval, pointed, serrated leaflets, nearly equal at their base. The flowers are in terminal cymes, consisting of five principal branches, and many small ones, with some of the flowers sessile. They are cream-coloured; with the calyx superior and permanent, and the corolla monopetalous, rotate, and somewhat convex. The berries are globular, and when ripe of a purplish black colour.

Qualities.—The *flowers* have a peculiar faint, sickly odour, and a bitterish taste, which are imparted to water by infusion,

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[1] *Schola Salernitana*, c. xxxviii. p. 406.

[2] *Van Swieten's Comment.* ii. 370.

[3] Ακτη Dioscoridis. The leaves laid in the subterraneous passages of moles are said to drive them away.

and also by distillation, during which a small portion of butyraceous oil is separated. The *berries* are inodorous, have a sweetish taste; and yield on expression a fine purple juice[1], which contains saccharine matter, jelly, and the malic acid. The *inner* bark is inodorous, and has a faint, sweetish taste, which is succeeded by a slight bitterness, and a very permanent acrimony. Both water and alcohol extract their virtues.

Medical properties and uses.—The flowers and berries are diaphoretic and aperient. The berries were formerly much used in febrile diseases, rheumatism, gout, and eruptive diseases; but they are now scarcely ever ordered. The flowers are used chiefly in fomentations and cooling ointments, and to afford their odour to water in distillation. The bark is a hydragogue purgative, and in large doses proves emetic at the same time. It is said to prove efficacious in dropsy; and in smaller doses to be a useful aperient and deobstruent in various chronic affections. The dose of the bark is from grs. x. to ʒ ss., given in wine; or ℥ j. may be boiled in O ij. of milk or of water down to O j., and the fourth part taken for a dose.

Officinal preparations.—*Succus spissatus Sambuci nigræ*, E. D. *Unguentum Sambuci*, L. D.

SAPO. Soap.[2]

Soap is a compound of margaric and oleic acids[3] with an alkaline, or an earthy, or an oxidized metallic base. The first kind is that which is employed in medicine, and has been longest known, having been invented by the Gauls at a period antecedent to historical record. Alkaline soap is of two kinds: one made with soda, and oil either animal or vegetable, or tallow, and called *hard soap;* the other made with potassa and similar oily matters, and called *soft soap.* For medical purposes it is essential that both kinds be made from the purest materials; and therefore the soap made in countries which produce olive oil, as the south of France, Italy, Tripoli, and Spain, is preferable to the soap of this country, which is generally manufactured from grease, tallow,

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[1] M. A. Chevalier has ascertained that paper stained with this juice is as delicate a test of the presence of alkalies and acids as litmus paper.—*Journ. de Pharm.* Avril, 1820.

[2] The name is derived, according to Beckmann, from the old German word *Sepe.*—*History of Inventions*, iii. 239.

[3] *Chevreul*, whose experiments have elucidated the nature of soap more than those of any other chymist, has ascertained that fixed oils and tallow consist of two substances; one solid, which he has named *steärin*, and the other fluid, which he has named *eläin*. These are altered by salifiable bases, and converted in the above-named acids; vide *Ann. de Chimie et de Phys.*

and other kinds of fat. The French pharmacopœia orders medicinal soap to be prepared with fresh oil of sweet almonds; and that the soap shall not be used until it is two months old.

1. HARD SOAP.

Officinal. SAPO DURUS, *Lond.* SAPO DURUS; *ex soda confectus, Edin.* SAPO DURUS, *Dub.* Hard Soap. Spanish Soap.

Syn. Savon blanc (*F.*), Spanische seife (*G.*), Spaansche zeep (*Dutch*), Silkestwal (*Dan.*), Sapone duro (*I.*), Xabon (*S.*), Nāt Sowcārum (*Tam.*), Sāboon (*Duk.*).

Hard soap is manufactured in Spain in the following manner:—To five parts of barilla, coarsely ground to powder, one part of quicklime, rendered fluid with a small portion of water, is added; and after some time the clear liquor, which is a strong solution of caustic soda, is drawn off, and called the *first ley;* with the residue more water is then mixed, and drawn off after some time, and called the *second ley;* and a *third ley* is procured by another portion of water treated in a similar manner. This last ley is then mixed with a quantity of olive oil equal in weight to the barilla employed, and the mixture boiled in an iron vessel, the second ley and a portion of the first being added in a gradual manner during the boiling. The boiling mixture is constantly stirred with a wooden pole; and when it becomes tolerably thick, a small portion of common salt is added, and the boiling continued for half an hour. The fire is then damped, and after some hours the clear liquor, which has separated, is drawn off, and the half-made soap again boiled with a little fresh water and the residue of the first ley. After the separation of the fluid of this boiling, it is again heated with a little water, and then poured into wooden vessels called frames, where it cools, and in a few days acquires a sufficient degree of hardness. Three parts of oil and three parts of soda produce five parts of firm soap.[1] Castile soap is made in the same manner, except that the marbled appearance which it presents is produced by the addition of sulphate of iron to a part of the alkaline ley, after the soap is fully boiled, which gives the blue colour; and the stirring in red oxide of iron, when the soap is almost made, gives the red colour.

Qualities.—Well-made hard soap, fit for medical use, has very little odour, and a nauseous, alkalescent taste; is white, and of a firm consistence; does not feel greasy, and is devoid of any saline efflorescence on the surface. With water it forms a milky, opaque solution; and with alcohol a nearly

[1] *Annales de Chimie,* xix. 253.

transparent, somewhat gelatinous solution.[1] It is decomposed by all the acids and acidulous salts; by alum, the hydrochlorate and the sulphate of lime, and sulphate of magnesia; in fact, by all the earths and most of the metallic salts: thence hard water, which contains sulphate of lime, does not properly dissolve soap. Nitrate of silver; ammoniated copper; tincture of chloride of iron; ammoniated iron; acetate, chloride, and bichloride of mercury; acetate of lead; tartarized iron; tartar emetic; sulphate of zinc, of copper, and of iron; and all astringent vegetable solutions, decompose it. According to the experiments of Darcet, Lelievre, and Pelletier, 100 parts of newly-made soap consist of 60·94 oil, 8·56 alkali, and 30·50 water: but these proportions vary in different kinds of soap; part of the water is lost by keeping, and the soap becomes lighter.

2. SOFT SOAP.

Officinal. SAPO MOLLIS, *Lond. Edin. Dub.* Soft Soap.

Syn. Savon Mou (*F.*), Sapone Molle (*I.*).

This soap is prepared in the same manner as the former; a caustic ley of potassa, however, being used instead of the soda ley. It was this variety of soap which was originally made by the Gauls and Germans, who employed wood ashes to afford their ley; and these are still used in many places.

Qualities.—Soft soap differs from hard soap chiefly in its consistence, which is never greater than that of hog's lard.

Both soft and hard soap are often adulterated either with an excess of water, or with lime, or gypsum, or pipe clay. The first may be detected by the extent of the loss of weight in drying the soap; the other adulterations by alcohol, which dissolves the soap and leaves them.

Medical properties and uses.—Soap is regarded as purgative and lithontriptic; externally applied, it is stimulant and detergent. For internal use, the hard soap only is employed. It is occasionally ordered in habitual costiveness, and in jaundice, combined with rhubarb, or some bitter extract; but its power as a purgative is very limited, and it cannot act in any other way in relieving jaundice. It is more useful in calculous habits, in which, however, its action is altogether confined to the stomach; for, as soap is decomposed by the weakest acids, its alkaline base corrects the acidity so prevalent in the stomachs of calculous patients, and thus, at least, assists in checking the increase of the disease. Soap is also beneficial

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[1] The alcoholic solution of soap is a convenient test for discovering earthy salts in mineral waters.

in decomposing some metallic poisons when taken into the stomach; and, as it is the antidote which can most readily be procured, should always be early resorted to. It is necessary, in this latter case, to give it in solution; of which a tea-cupful should be drunk at short intervals, till the effects expected from it be produced. In other cases it is preferable to give it in substance. As an external remedy, soap is efficaciously used in frictions to sprains and bruises; and we have seen much benefit derived from rubbing the tumid bellies of children labouring under mesenteric fever with a strong lather of soap every morning and evening. The dose internally is from grs. iij. to ʒss. made into pills.

Officinal preparations.—*Pilulæ Saponis compositæ*, L. D. *Pil. Scillæ comp.*, L. D. *Pil. Aloet.*, E. *Pil. Aloes et Assafœtidæ*, E. D. *Pil. Colocynth. comp.*, D. *Emplastrum Saponis*, L. E. D. *Ceratum Saponis*, L. *Linimentum Saponis comp.*, L. *Linimentum Saponis cum Opio*, E. D.

SARSAPARILLÆ RADIX. Vide *Smilax*.

SASSAFRAS LIGNUM ET RADIX. Vide *Laurus*.

SCAMMONIÆ GUMMI RESINA. Vide *Convolvulus*.

SCILLA. *Spec. Plant. Willd.* ii. 125.

Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. ord.* Asphodeleæ.

G. 640. *Corolla* six-petaled, spreading, deciduous. *Filaments* thread-like.

Species 1. S. *maritima.*[1] Officinal Squill. *Med. Bot. 3d edit.* 745. *t.* 255.

Officinal. SCILLA, *Lond.* SCILLÆ MARITIMÆ RADIX, *Edin.* SCILLÆ MARITIMÆ BULBUS, *Dub.* (Squill bulb).

Syn. Scille (*F.*), Meerzwiebel (*G.*), Zeeajuin (*Dutch*), Skille (*Dan.*), Söilok (*Swed.*), Scilla (*I.*), Cebolla abarruna (*S.*), Albarra, Alvazraä (*Port.*).

This species of squill is a native of Spain, Sicily, Syria[2], and Barbary, flowering in April and May. The bulb is large, sometimes nearly the size of the human head, of a pear shape, and formed of fleshy scales, attenuated at both edges, and closely applied one over the other. The roots are fibrous, attached to a radical plate at the bottom of the bulb. The stem is round, smooth, and succulent, rising about three feet in height from the centre of several radical, sword-shaped, straight, pointed, long leaves, of a deep green colour. The flowers are produced in a long close spike upon purplish peduncles, with a linear, twisted, deciduous bracte at the base

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[1] Σκιλλη Dioscoridis. The trivial name *maritima* has been objected to, as it does not generally grow on the sea-coast.

[2] The soil at Navarino, which is remarkable for the production of an infinite quantity of squills, "is of a red colour."—*Gell's Journ. in the Morea*, p. 21.

of each peduncle. The corolla consists of six white, ovate, spreading petals, with a reddish mark in the middle of each; the filaments are shorter than the corolla, tapering, and furnished with oblong, transversely placed anthers: the germen is roundish: the style and stigma are simple; and the capsule is oblong, smooth, three-celled, and contains many roundish seeds.

There are two varieties of the officinal squill; one with a white bulb, and the other with a reddish bulb; but both are indiscriminately used, and do not differ in their virtues. The bulbs are brought from the Levant generally in bulk. They are preserved fresh in sand; but, as they are apt to spoil, it is preferable to keep them in the dried state. (See *Preparations.*)

Qualities.—The squill bulb is inodorous; its taste is bitter, nauseous, and acrid; and when much handled it inflames and ulcerates the skin. The expressed juice slightly reddens litmus paper. The acrimony, on which its virtue depends, is partially dissipated by drying and long keeping, and completely destroyed by any heat above 212°: it is extracted by water, alcohol, and vinegar. The expressed juice, when diluted with water, filtered, and boiled, does not yield flakes of albumen, as has been stated.[1] Nitrate of mercury and superacetate of lead separate from the juice white curdy precipitates. Gelatine throws down a copious precipitate; and, in a less degree, the same effect is produced by lime-water and the alkaline carbonates. Infusion of galls forms in it pale brownish flakes; sulphate of iron throws down a green precipitate; lime evolves ammonia. When the insoluble part of dried squill is digested in hydrochloric acid, filtered, and ammonia added in excess, a copious precipitate is thrown down, which is citrate of lime. Ether, digested on dried squill, acquires a pale green hue, and, when evaporated on the surface of water, a thin pellicle of very bitter resinous matter is deposited; while the water acquires an intensely bitter taste, and yields copious precipitates, with solutions of acetate of lead and nitrate of silver. From these imperfect experiments, squills appear to contain extractive, a small portion of resin, mucus, carbonate of ammonia, the bitter principle, and citrate of lime. Vogel, from a careful analysis of squill, gives the following as its principles:—Gum six parts; bitter

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[1] But when the expressed juice is boiled till one half is dissipated, a white precipitate is thrown down, which when washed with alcohol appears to be citrate of lime.—*Annales de Chimie*, vol. lxxxiii. p. 149.

principle (*scillitina*[1]) 35; tannin 24; citrate of lime 0; saccharine matter 6; woody fibre 30[2], in 100 parts of the dried bulb.

Medical properties and uses.—Squill, in small doses, is expectorant and diuretic; in larger doses, emetic and purgative. Its medicinal powers were very early known, and it still retains its character as a remedy of great efficacy when judiciously exhibited. Although it operates powerfully as an expectorant, yet from its stimulating properties it cannot be given with propriety in pulmonary inflammations, until the fever and inflammatory action be previously greatly subdued by bleeding, and other evacuants; after which, by promoting a more copious excretion from the mucous follicles, it rapidly unloads the chest, and relieves the congestion and difficulty of breathing. It is more useful when combined with nitrate of potassa, tartar emetic, or ipecacuanha; and in asthma and dyspnœa without fever, squill combined with ammoniacum is, perhaps, the best remedy we can employ. In dropsies, conjoined with a mercurial and opium, the efficacy of squill is well ascertained. Its diuretic powers are much increased by this combination; perhaps depending on the absorbents being powerfully excited by the mercury, while the squill determines to the kidneys. Cullen recommends [3] the bichloride of mercury as the best adjunct; but I have seen every purpose answered by calomel. Squill is a very uncertain emetic, a very small dose producing the most cruel vomiting in some persons, while in others the largest doses do not even excite nausea: where, however, it readily and moderately induces vomiting, it proves more useful in hooping-cough and croup than any other emetic. To produce its expectorant and diuretic effects, squill must be given in substance; but to excite vomiting, its infusion in vinegar, or the oxymel, is more usually employed. Of the dried squill gr. j. in the form of a pill may be given at first for a dose, morning and evening, or every six hours; gradually increasing the dose to grs. iij. or grs. iv., or until some degree of nausea is induced, and its expectorant or diuretic operation is obtained. In an over-dose it vomits, purges, produces strangury, bloody urine and stools, severe gripings, convulsions, and cold sweats.

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[1] Scillitina is white, transparent, breaks with a resinous fracture, and is pulverulent; but it attracts moisture rapidly from the atmosphere until it becomes fluid. It has an intensely bitter taste, with a slight degree of sweetness; and is very soluble in water and in alcohol.

[2] *Annales de Chimie*, vol. lxxxiii. p. 158.

[3] *Materia Medica*, ii. 558.

Officinal preparations. *Acetum Scillæ*, L. E. D. *Oxymel Scillæ*, L. D. *Pilulæ Scillæ comp.*, L.E. D. *Pulvis Scillæ*, E. D. *Syrupus Scillæ maritimæ*, E. *Tincturæ Scillæ*, L. D.

SCROPHULARIA. *Spec. Plant. Willd.* iii. 269.

Cl. 14. *Ord.* 2. Didynamia Angiospermia. *Nat. ord.* Scrophularineæ.

G. 1152. *Calyx* five-cleft. *Corolla* subglobular, resupine. *Capsule* two-celled.

Species 2. S. *nodosa.* Knobby-rooted Figwort. *Smith, Flora Brit.* 663. *Eng. Bot.* 1544.

Officinal. SCROPHULARIA; FOLIA, *Dub.* Figwort herb.

Syn. La Scrophulaire aquatique (*F.*), Die Wasser-Braunwurz (*G.*), Waterspeenkruid (*Dutch*), Scrofularia aquatica (*I.*), Escrofularia aguatica (*S.*), Escrofularia dos rios (*Port.*).

This is an indigenous perennial plant, growing in woods and about hedges, flowering in July. The root is tuberous and knobbed or granulated. The stem rises three feet in height; is erect, simple, sharply quadrangular, smooth, and leafy. The leaves are opposite, petiolate, cordate, pointed, unequally serrated, veined, smooth, cut away at the base to the two small lateral veins, and as if three-nerved. The flowers are in terminal bunches, erect, with the peduncles opposite, dichotomous, and bracteolated: of a dark blood-red colour: the capsules are ovate and pointed.

Qualities.—The recent leaves have a rank, fœtid odour, resembling that of elder leaves, and a bitterish, disagreeable taste; but both these qualities are nearly lost by drying. They yield their virtues to water; and the infusion precipitates sulphate of iron brown.

Medical properties and uses.—Figwort is supposed to possess diuretic and sedative properties. It has been used in scrofula, whence its name; and is recommended as a fomentation to piles, malignant tumours, spreading ulcers, and cutaneous eruptions, but is very little known in practice.

SENEGÆ RADIX. Vide *Polygala.*

SENNÆ FOLIA. Vide *Cassia.*

SERPENTARIÆ RADIX. Vide *Aristolochia.*

SEVUM. Vide *Ovis.*

SIMARUBA. *Spec. Plant. Willd.* ii. 567.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Simarubeaceæ.

G. 849. *Calyx* five-leaved. *Petals* five. *Nectary* five-leaved. *Drupes* five, distant, bivalve, inserted into a fleshy receptacle.

Species 2. Simaruba *officinalis.* Simaruba Quassia.[1] *Med. Bot.* *3d edit.* 569. *t.* 203. *Trans. of the Royal Society of Edin.* ii. 73—81.

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[1] Named after Quassia, a negro slave, who discovered to Rolander the wood of the Quassia excelsa, which he had employed with success as a secret remedy in the

1. SIMARUBA OFFICINALIS.

Officinal. SIMARUBA, *Lond.* QUASSIÆ SIMARUBÆ CORTEX, *Edin.* CORTEX RADICIS, *Dub.* Simaruba bark and wood.

Syn. Ecorce de Simarouba (*F.*), Simarubenrinde (*G.*), Corteccia de Simaruba (*I.*).

The Simaruba quassia, or mountain damson, as it is called in Jamaica, is a native of South America, Carolina, and the West Indian islands, growing in sandy places. It is a tall tree, with alternate branches, and a smooth grey bark, maculated with yellow spots. The leaves are pinnate, consisting of from two to nine leaflets, placed alternately on short petioles, elliptical, acute, smooth, and of a deep green colour above, and whitish beneath: the flowers are male and female on the same axillary panicles: the calyx in both is monophyllous and five-toothed: the petals lanceolate, yellowish, white, and inserted into the calyx: the nectary in the male is a small scale affixed to the inner part of the base of each filament; and the same in the female, except that the scales are placed in a regular circle: the filaments of the male are the length of the corolla; and in the female are five connate germens, with five striated styles and spreading stigmas; the fruit, according to Gærtner, consist of five smooth, ovate, black, one-celled berries, on a common receptacle; and opening spontaneously when ripe.[2]

The officinal part of this tree is the bark of the root: and although the wood is designated by the Dublin College, yet it is quite inert. The bark is imported in long pieces, a few inches in breadth, and folded lengthwise. It comes generally from Jamaica packed in bales.

Qualities.—Simaruba bark is inodorous, and has a bitter but not disagreeable taste. The pieces are of a very fibrous texture, rough, scaly, warty, and of a full yellow colour in the inside when fresh. Alcohol, wine, and also water, take up all its active matter by simple maceration, at a temperature of 60° Fahrenheit, better than at a boiling heat. The infusion is stronger in taste than the decoction, which grows turbid, and of a reddish brown colour, as it cools. The infusion is little affected by sulphate of iron or chloride of tin. M. Morin and Rouen have analyzed simaruba, and found in it resin, a volatile oil having the odour of benzoin, malic and gallic acids,

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malignant endemic fevers of Surinam. The genus is placed in the class *Decandria,* because the Quassia *amara,* from which the generic description is taken, has hermaphrodite flowers.

[2] Owing to this circumstance, Gærtner allows that the pericarp is something between a berry and a capsule. It is certainly not a drupe, although mentioned as such in the generic character by Willdenow.

an ammoniacal salt, acetate of potassa, malate and oxalate of lime, oxide of iron, alumen, and a peculiar bitter principle, which they have named *quassina.*[1]

Medical properties and uses.—This bark is tonic; and has been employed with advantage in intermittent fever, obstinate diarrhœa, dysentery, and dyspeptic affections. It was first introduced at Paris in 1713, as a powerful remedy in dysentery: but its effects in this disease were previously known to the natives of Guiana, whence it was brought to France. Simaruba bark, however, was little known in this country till Dr. Wright's paper on it appeared in the Edinburgh Transactions. It cannot with propriety be used in the commencement of dysentery; but after the fever has abated, when the tenesmus continues, with a weak sinking state of the pulse, it allays this symptom and griping, promotes the secretion of urine, determines to the surface, and restores the tone of the intestines. It has also been highly commended as a remedy in fluor albus; but notwithstanding the high character which it acquired, simaruba is not much employed by the British practitioner. It may be combined with aromatics and opium. The dose in substance is from ℈ j. to ʒ ss.; but it is more frequently and commodiously given in the form of infusion.

Officinal preparation.—*Infusum Simarubæ,* L. D.

SINAPIS.[2] *Spec. Plant. Willd.* iii. 534.

Cl. 15. *Ord.* 2. Tetradynamia Siliquosa. *Nat. ord.* Cruciferæ.

G. 1246. *Cal.* spreading. *Cor.* claws erect. *Gland* between the shorter stamens and pistil, and the longer stamens and calyx.

Species 4. S. *alba.* White mustard. *Smith, Flora Brit.* 721.

Species 5. S. *nigra.* Common Mustard. *Med. Bot. 3d edit. t.* 151. *Smith, Flora Brit.* 722.

1. SINAPIS ALBA.

Officinal. SINAPIS ALBÆ SEMINA, *Edin.* SINAPI; SEMINA, *Dub.* White Mustard-seed.

Syn. Moutarde (*F.*), Senfsamen (*G.*), Mosterd (*Dutch*), Senep (*Dan.*), Senape bianca (*I.*), Grano de Mostaza (*S.*), Mostardeira (*Port.*), Gortschiza (*Russ.*), Kabar (*Arab.*), Sinap (*Swed.*), Gerzykare (*Pol.*).

This species of mustard is an indigenous annual plant, growing in the fields and by road sides; but it is also much cultivated for salads, in which the young plant is used. It flowers in June. The root is spindle-shaped; and the stem round, strong, branched, and rising nearly two feet in height. The lower leaves are deeply pinnatifid, the upper sublyreat; and the whole rough, with strong hairs on both sides, toothed,

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[1] *Journal de Pharmacie.* Février, 1822.

[2] Σινηπι Dioscoridis.

and of a pale green colour. The flowers are in racemes, with striated peduncles: the leaflets of the calyx are linear and green; the petals yellow, with the claws narrow, and the border obovate and entire. The pods are spreading, on almost horizontal peduncles, hispid, roundish, ribbed, swelling where the seeds are placed; and furnished with a very long, ensiform, keeled, greenish, rough beak. The seeds are large for the size of the pod, globular, and of a light yellow or pale yellowish brown colour.

2. SINAPIS NIGRA.[1]

Officinal. SINAPIS, *Lond.* SINAPIS SEMINUM PULVIS, *Dub.* Mustard-seeds.

Syn. Moutarde noir (*F.*), Schwarzer Senfe (*G.*), Senape (*I.*), Mostaza nigra (*S.*).

Common mustard is an indigenous annual; and although very plentiful in its wild state, yet it is cultivated for domestic and medicinal purposes. It flowers in June. The root is small. The stem, which rises three or four feet in height, is very much branched and spreading. The leaves are petiolate, variously lobed, and toothed; those nearest to the root being rugged, while those of the stem are smooth; and the uppermost narrow, quite entire, and hanging down, which distinguishes it at first sight from its congeners. The flowers are yellow, and small; the calyx is coloured; the pods erect, parallel to the stem, short, quadrangular, frequently smooth, many-seeded, and furnished with a short quadrangular beak. The seeds are small, globular, and of a deep brown colour.

Although the seeds of these two species of mustard differ in their botanical characters, yet they agree in other respects, the black being only more pungent than the white: they may be indiscriminately employed. The mark, after the oil is expressed, reduced to a fine powder, forms the common condiment every day used at our tables.

Qualities.—These seeds, in the entire state, are nearly inodorous, but when bruised they have a pungent, penetrating odour. Their taste is bitterish, acrid, and biting. Unbruised mustard-seeds, when macerated in boiling water, yield an insipid mucilage, which resides in the skin; but, when bruised, water takes up all their active matter, although it is scarcely imparted to alcohol. They contain a fixed bland oil, which is purgative in large doses. In distillation with

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[1] Νᾶπυ Hippocratis.

water, mustard-seeds yield a very acrid volatile oil, on which their virtues are supposed to depend. It is united in the seed with fecula or starch: its force appears to be obtunded by a soft, insipid, fixed oil, which can be separated by pressure; and the cake left after the expression is considerably more pungent and acrid than the unpressed seeds. The acrimony is not dissipated by drying, nor by keeping the seeds, and is rendered considerably more active by the addition of vinegar. When the seeds are triturated with lime and a few drops of water, ammonia is plentifully evolved; hence their constituents appear to be starch, mucus, a bland fixed oil, an acrid volatile oil, and an ammoniacal salt. The researches of several eminent French chymists have ascertained that the active principle of *white* mustard is not volatile oil, but is a combination of a new substance (*sinapisine*) and some other product containing sulphur. The active principle of black mustard, however, is a volatile oil, which it is said does not pre-exist in the seed, and requires the presence of water for its developement.

Medical properties and uses.—Mustard-seeds are stimulant, emetic, diuretic, and rubefacient. Swallowed whole, they have been thought to be useful in dyspepsia, chlorosis, and the torpid state of the intestines which accompanies paralysis. The bruised seeds, or the powder, to the extent of a large tea-spoonful mixed with water, form an excellent emetic in paralytic, epileptic, and some apoplectic cases, often operating quickly and fully when other emetics fail. In small doses they are found to promote considerably the secretion of urine; and consequently they prove beneficial in dropsies. In these affections, however, perhaps the best mode of exhibiting mustard is in the form of whey, which is made by boiling ʒiv. of the bruised seeds in O j. of milk, and straining to separate the curd. A fourth part of this quantity may be taken for a dose three times a day. But mustard is most frequently employed as an external remedy. The flour rubbed on the skin, or applied in the form of a cataplasm, made with crumbs of bread and water[1], soon excites a sense of pain, considerable inflammation, and sometimes vesication. The volatile oil is a violent rubefacient. In the form of cataplasm, mustard has been found serviceable in paralysis; and, when applied to the soles of the feet, in the delirium of typhus, and in comatose affections. It is proper to limit the period of the application of the cataplasm within the time of vesication, as

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1 Vinegar is usually ordered; but experiments have proved that water developes the acrimony of mustard better than vinegar.

where this occurs it is apt to run on to ulceration and gangrene.

Officinal preparations.—*Cataplasma Sinapis,* L. D. *Emplastrum Meloes comp.,* E.

SMILAX.[1] *Spec. Plant. Willd.* iv. 774.

Cl. 22. *Ord.* 6. Diœcia Hexandria. *Nat. ord.* Smilaceæ.

G. 1800. *Male.* *Calyx* six-leaved. *Corolla* none.

——— *Female.* *Calyx* six-leaved. *Cor.* none. *Styles* three. *Berry* three-celled. *Seeds* two.

* *Stem prickly, angular.*

Species 9. S. *officinalis.* Sarsaparilla plant.[2] Humboldt, *Plant. Æquinoct.* 1. 271.

Officinal. SARZA, *Lond.* SMILACIS SARSAPARILLÆ RADIX, *Edin. Dub.* Sarsaparilla root.

Syn. Racine de Salsepareille (*F.*), Sarsaparille (*G.*), Sarzaparille (*Dutch*), Radiche della Salsapariglia (*I.*), Zarzaparilla (*S.*), Salsaparilha (*Port.*), Juapecanha (*Brazil*).

Smilax *officinalis* is a native of South America, growing on the river Magdalena. The roots are somewhat thicker than a goose-quill, straight, externally brown, internally white, and three or four feet in length. The stems are shrubby, long, slender, scandent, and beset with spines: the leaves alternate, petiolate, oblong oval, pointed, cordate, coriaceous, smooth, with five to seven cortæ. The flowers stand three or four together upon a common peduncle; the calyx of the *male* flower is bell-shaped, coloured, with the segments oblong, spreading, and reflected at their points: the filaments are six, simple, and bearing oblong anthers: the calyx of the *female* flower is also bell-shaped: the germen ovate, supporting three minute styles, with oblong, reflexed, hairy stigmas: and the fruit a round, three-celled berry, containing two globular seeds. But several species of smilax are gathered under the name of sarsaparilla. The best grows wild on the borders of a lake on the north of the Cerra Unturan, not far from Esmeralda. It is celebrated all over South America by the name of *Zarza del Rio Negro.*[3]

The dried root is imported packed in bales. It is known in the London market by the names Lisbon, Jamaica, Honduras, and Vera Cruz Sarza. Humboldt states that nearly 5000 quintals are annually exported from Vera Cruz.[4] The

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[1] Σμιλαξ Dioscoridis.

[2] Bauhin derives the name from *zarsa,* which, he says, is the Spanish for red; and *parilla*, a little vine. The latter part of the derivation is correct; but we are inclined to think the first part must be referred to *zarza*, a brier or bush: hence Zarzaparilla would imply *a bushy little vine.*

[3] It is purposely smoked in drying it.—*Humboldt's Personal Nar.* vol. v. p. 378. *trans.*

[4] *Polit. Essay,* vol. ii. p. 442. Clusius asserts, that Europe received the first sarsaparilla from Iucaton and the island of Puna, opposite Guayaquil.

Lisbon root, which is the produce of Brazil, growing between the sources of the Orinoco and the Rio Nigro, has a reddish or dark brown cuticle; is internally farinaceous, and more free from fibre than the other kinds: the *Honduras* has a dirty brown, and sometimes greyish cuticle; is more fibrous, and has more ligneous matter than the Lisbon. The Jamaica differs from the others, in having a deep red cuticle of a close texture, and the colour is partially diffused through the ligneous part.[1] The *Vera Cruz* is in long slender twigs, covered with a wrinkled brown cuticle, and has a small woody heart.

Qualities.—This root is inodorous, and has a mucilaginous, very slightly bitter taste. The whole of the efficacious part of the plant resides in the bark, the ligneous part being tasteless, inert, woody fibre. The root when macerated communicates to cold as well as to boiling water, and partially to alcohol and ether, any active matter it possesses. The watery infusion has a brown colour, reddens litmus paper, and yields a precipitate with infusion of galls, which is again dissolved when the infusion is heated, demonstrating its close affinity to starch. It is precipitated also by lime-water, and solution of nitrate of mercury, and acetate of lead; but it is not affected by sulphate of iron, or any other of the metallic oxides. The alcoholic tincture has a yellowish red hue, is rendered turbid by the addition of water, and yields a slightly bitter pungent extract. Ether takes up two parts in ten of the powdered root; and the tincture, which has a golden yellow colour, when evaporated on water, leaves a small portion of reddish yellow insipid resin, and a larger of yellowish extractive dissolved in the water. The root brought from Jamaica yields rather more than two parts for one of extract yielded by the other kinds, and is, therefore, regarded as the best for medicinal use. M. Galileo-Pallota has separated from it an alkaloid substance, in which he supposes the virtue of the root resides, and has named it *parillina.* This salt is white, pulverulent, light, permanent in the air, austere, slightly astringent, nauseous, and having a peculiar odour. It is insoluble in cold, but very soluble in hot water; slightly soluble in cold alcohol, but very soluble in hot. It reddens turmeric paper, fuses at 212°, and is decomposed at a higher temperature; forms a sulphate with diluted sulphuric acid, but is decomposed by the strong acid. It forms neutral salts with the

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[1] The Smilax *aspera* and *excelsa,* which is described by Theophrastus, and grows in the woods and on the hills of the Bosphorus, is used in the Levant, in decoctions, as a substitute for sarsaparilla.—*Hort. Trans.* vol. vi.

other acids.[1] Thubeuf analysed Sarza and obtained 1. a crystallized principle, the *parillina* of Pallotta; 2. colouring matter; 3. resin; 4. starch; 5. lignin; 6. a fixed oil; 7. wax; 8. hydrochlorate and nitrate of potassa. The *smilacin* of Folchi, and the *parillinic* acid of Bakta are the same as the crystalline principle of Thubeuf; but it is doubtful whether this can be regarded as the active principle of Sarza.

Medical properties and uses.—Sarsaparilla is demulcent, and said to be diuretic. It was brought to Europe about the year 1563, and introduced as a medicine of great efficacy in the cure of lues venerea; but it fell into disrepute, and was little used, till it was again brought into esteem by Dr. William Hunter and Sir William Fordyce, about the middle of the last century; not, however, as a remedy fitted to cure syphylis[2], but of much efficacy in rendering a mercurial course more certain, and after the use of mercury.[3] Experience, however, has not verified the encomiums bestowed on it; and the extensive observations of Mr. Pearson have fixed the degree of benefit which is to be expected from this root in syphilitic complaints. "The contagious matter, and the mineral specific, may," he observes, "jointly produce, in certain habits of body, a new series of symptoms, which, strictly speaking, are not venereal[4]; which cannot be cured by mercury, and which are sometimes more to be dreaded than the simple and natural effects of the venereal virus. Some of the most formidable of these appearances may be removed by sarsaparilla, the venereal virus still remaining in the system; and when the force of the poison has been completely subdued by mercury, the same vegetable is also capable of freeing the patient from what may be called the sequelæ of a mercurial course."[5] Sarsaparilla is also recommended in scrofula, elephantiasis or cutaneous affections resembling it, and chronic rheumatism; but its efficacy is doubtful. From experiment made upon himself, M. Pallota

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Journal of Science, xviii. p. 164.

[2] The celebrated Mutis, in a letter to the younger Linnæus, says, "Scarcely any *Lues Venerea* resists my method of administering a drink of this medicine." (*Correspondence of Linnæus*, vol. ii. p. 549.) But we must recollect that syphilitic complaints are as benign as they are common, both among the whites and the mixed castes, in South America; and as they yield to this remedy, the quantity of sarsaparilla employed in the Spanish colonies is very considerable. See *Humboldt's Pers. Nar.* vol. v. p. 379.

[3] *Medical Observations and Enquiries*, vol. i.

[4] The symptoms alluded to are nocturnal pains in the limbs, painful enlargements of the knee and elbow joints, membranous nodes, and cutaneous ulcerations, arising after a full course of mercury.

[5] *Pearson on Remedies for Lues Venerea*, p. 24.

considers that parillin is a powerful debilitating medicine, diminishing the vital energy in proportion to the dose.

The dose of the powdered root is from ℈j. to ʒj., given three or four times a day. Of the parillin from grs. ii. to xiii. may be given for a dose.

Officinal preparations.—*Decoctum Sarzæ*, L. *Decoctum Sarsaparillæ*, E. D. *Decoctum Sarsaparillæ compositum*, D. *Extractum Sarzæ*, L. *Eztractum Sarsaparillæ fluidum*, D. *Infusum Sarsaparillæ compositum*, D.

SODÆ ACETAS, *Lond.* Acetate of Soda.

Syn. Acetate de Soude (*F.*), Essigsaures Natron (*G.*), Acetato di Soda (*i.*).

This salt is prepared in considerable quantity by the manufacturers of pyroligneous acid. It is formed by saturating the impure acid, distilled from wood, with chalk, then boiling the mixture and completing the saturation with slaked lime. A black scum forms, which being removed, the acetate is next decomposed by sulphate of soda; an insoluble sulphate of lime and a soluble acetate of soda are the result. After the sulphate, which carries down with it many impurities, has fully subsided, the solution of the acetate is decanted, evaporated to a pellicle, and crystallised. It is purified by submitting it to the action of heat till it fuses, after which it is again dissolved in water, filtered and re-crystallised.

Qualities.—Acetate of soda as it is usually procured, is a white irregularly crystallised salt, with a sharp, bitterish, not unpleasant taste. When crystallised with care, the crystals are a modification of the oblique, rhombic prism. Exposed to the air, the crystals slowly effloresce, and lose about 40 per cent. of their weight: at 550° Fahrenheit, they lose the whole of their water of crystallisation, and undergo igneous fusion without decomposition, which takes place at 600°. Acetate of soda is soluble in 3 parts of water at 60°, and in 24 parts of alcohol. It is a compound of 1 eq. of acetic acid = 51·48 + 1 of soda = 31·3 + 6 of water = 54—equiv. 136·78.

Medical properties and uses.—Acetate of soda is diuretic; but although it is not deliquescent, and, consequently is more manageable than the acetate of potassa, yet it is seldom ordered. The dose is from ℈j. to. ʒj. It is chiefly used for the preparation of acetic acid.

Officinal preparation.—*Acidum aceticum.*

SODÆ BI-BORAS, *Lond.* BORAS SODÆ, *Edin. Dub.* Bi-borate of Soda.[1]

[1] The term *borax* is a corruption of the Arabic word *buruk*, which signifies *brilliant*. Vide *Asiatic Researches*, 8vo. vol. iii. p. 255.

Syn. Borate alcalinule de Soude (*F.*), Borax (*G.*), Borace (*I.*), Borrax (*S.*), Tineal (*Portuguese*), Buruk (*Arab.*), Tancána (*San.*), Sohaga (*H.*), Valligarum (*Tam.*), Patteric (*Malay*), Tunkav (*Pers.*), Pigar (*Jav.*)

This is the purified state of a natural salt found in Persia and Thibet. In the latter country it is formed in the bed of a lake situated among the mountains, fifteen days' journey from Tisolumboo, which is twenty miles in circumference, and supplied only by springs from the bottom.[1] The borax is dug in large masses from the edges and shallows of the lake; yet the quantity is not diminished, the cavities being gradually filled by a fresh deposition of the salt. In this state it is named *tincal*, and is brought home packed in chests, in masses of adhering crystals, of a grey yellowish, or greenish white colour, intermixed with sand and other impurities, and covered with a greasy artificial production to prevent it from efflorescing. The purification of tincal was first discovered by the Venetians; and afterwards long carried on by the Dutch, who kept the process secret. Pelletier has ascertained, that, by destroying the unctuous matter by calcination, the salt may be obtained pure by solution and crystallization.[2] His method has been practised in England, but at present scarcely any tincal is imported, and the greater part of the borax used in England is made by saturating the boracic acid, procured from the vapour springs of Volterra, near Leghorn[3], with carbonate of soda.

Qualities. — Purified bi-borate of soda is inodorous, and has a styptic, cool, alkalescent taste. It is of a white colour, and usually in irregular, crystalline masses, approaching to the form of hexangular prisms, terminated by triangular pyramids. It effloresces slowly and very slightly in the air; dissolves in twelve times its weight of water at 60° of Fahr., and in twice its weight of boiling water; the solution changing the vegetable blues to green. In a moderate heat it undergoes the watery fusion, loses four tenths of its weight, and becomes a dry, white, spongy mass, without

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1 Saunders, *Phil. Trans.* vol. lxxix. p. 97.

2 *Mémoires de Chimie*, vol. i. p. 82.

3. The following is the method of making the acid at Volterra. A cavity or basin is dug round the openings whence the vapour issues, and a small stream of water conducted into it: but as soon as the basin is filled the stream is turned aside. The vapour is condensed in the water of the basin, and the heat, which it evolves, aiding the spontaneous evaporation of the water, this gradually becomes a concentrated solution of boracic acid, and is transferred to leaden troughs in which it is farther concentrated by the assistance of fire. The solution is then put into casks, on the sides of which the boracic acid is deposited in crystals, which are collected, and, without any further purification, are brought to market.

undergoing any decomposition. According to Bergman, 100 parts consist of 34 acid, 17 soda, and 49 water [1]; or 2 equivalents of boracic acid $(34{\cdot}9 + 2) = 69{\cdot}8 + 1$ of soda $= 31{\cdot}3 + 10$ of water $= 90$, making the equivalent of the salt 191·1. It is decomposed by the majority of the acids; by potash, and the sulphates, hydrochlorates, phosphates, and fluates of the earths, and of ammonia.

Medical properties and uses. — This salt is refrigerant and detergent. I have given it internally, in aphthous affections, and in excessive salivation, with much advantage; and it is a useful topical application when mixed with honey, in aphthæ of the mouth.

Officinal preparation.—*Mel Boracis*, L. E. D.

SODÆ CARBONAS IMPURA. *Lond.* SUBCARBONAS SODÆ IMPURUS. *Barilla, Edin.* SODÆ CARBONAS VENALE. *Barilla, Dub.* Impure Soda. Carbonate of Soda. Barilla. [2]

Syn. Soude (*F.*), Kohlensaures Natrum (*G.*), Charuni (*Malab.*), Soda (*I.*), Barilla (*S.*), Sejjimitti (*H.*), Sorjica (*San.*), Karum (*Tam.*), Loogzout (*Dutch*), Soda (*Russian*).

Carbonate of soda is found native in Hungary, Syria, Egypt, Arabia, Thibet, India, China, Siberia, and South America [3], on the surface of the earth, and on the margins of some lakes which become dry in summer. A large quantity is annually collected from the natron lakes of Hungary in the vicinity of Debretzin, and from those of Egypt, situated in the valley Bahr-bela-ma, near the Delta. The Trona lake, which lies between Wadies Shiati and Ghrurbi, yields annually between 400 and 500 camel loads, each equal to about 4 cwt. It is obtained by a man wading into the lake and breaking it off in sheets, which are afterwards packed in the setose basis of the palm leaves. [4] It is named szekso in Hun-

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1 According to the experiments of M. Soubeirons, the borate consists of 32·416 soda, and 67·584 boracic acid.

2 Νιτρον of the ancients. This term was converted in the middle ages into *natrum* or *natron;* while the real word Νιτρον was improperly applied to nitre: but the ancients were unacquainted with nitre; and the term *natrum* is never found in the works of the Greeks or the Romans, and not even in those of good writers of the middle ages. Beckmann proves that nitre was not known, even in Europe, till the invention of gunpowder. — *Hist. of Inventions,* iv. p. 537.

3 Native carbonate of soda is found in considerable quantity in a small lake, near the Indian village Lagunillas, situated to the south-east of Merida, in the republic of Colombia. It is termed *Urao* by the natives. It contains one fourth more soda than the Trona of Egypt, and more carbonic acid than the artificial carbonate. — *Annales de Chimie,* tom. xxix. p. 110.

4 Letter from Dr. Oudney to Professor Jameson.—*Edin. Phil. Journ.* vol. xi. p. 384.

gary, and *trona* by the natives of Egypt: but very little of it finds its way to Britain; and the greater part of that which is employed, in this country at least, is of vegetable origin, being prepared from the ashes of some species of *algæ*, but more abundantly from those of the Salsola *soda* and Salicornia *herbacea*, plants which are cultivated on the shores of the Mediterranean, by the Spaniards, expressly for the purpose of yielding this salt. In the vicinity of Alicant, and near Carthagena, two hundred thousand quintals of salsola are gathered annually. In September, when the seed is ripe, it is pulled up by the roots; after which it is dried, and in October burnt in simple furnaces, the heat of which is just sufficient to cause the ashes to enter into a state of semifusion, and concrete into cellular masses, which form the *barilla* of commerce. The barilla of Ustica in Sicily is esteemed the finest in Europe; and its excellence is supposed to depend on the plant being burnt before it is thoroughly dry.[1] That which is obtained in this country by burning the sea-wrack (chiefly the fucus *vesiculosus* and *serratus*) is denominated *kelp*; and is the worst description of this salt.[2] Sardinia also furnishes some barilla, but inferior in quality to the Spanish. In Sicily, barilla is procured at *Catania*, *Trapani*, *Marsala*, *Terranora*, and *Girgenti*. Orkney furnishes annually about three thousand tons of kelp.[3]

Vauquelin has proved that the salt exists ready formed in salsola soda, and is only set free by the burning of the plant.[4] He obtained from 500 parts of the plant 100 parts of ashes, besides oil, ammonia, and prussic acid; but the plant also contains iodine. Five hundred grains of the ashes afforded 113 of chloride of sodium, 68 dry carbonate of soda, 204 insoluble carbonate of magnesia, 100 of sand, and oxide of iron, and 23 of water[5]; an analysis which may be regarded as exhibiting the general components of barilla.

There are several varieties of barilla brought from Spain; that which is known by the name of *sweet barilla* is the most

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[1] *Smyth's Sicily and its Islands*, 4to. p. 15.

[2] The inhabitants of the Canary isles extract carbonate of soda from the ashes of the mesembryanthemum *crystallinum*, or ice-plant, which yield one third of their weight of the salt — *Phil. Mag.* vi. 187.

[3] The sea-wrack is cut from the rocks in April and May chiefly, dried in the air, and then burnt in a kiln, in which they are stirred with an iron rake into a fluid state; on cooling, the ashes condense into a dark blue or whitish mass, very hard and solid. The plants about three years old yield the largest quantity of kelp. The best kelp has an acrid caustic taste; a sulphurous odour; is compact, and of a dark blue greenish colour. It yields about one twentieth part of its weight of soda.

[4] *Annales de Chimie*, xiii. 65.

[5] *Annales de Chimie*, xviii. 76.

esteemed. A tolerably pure carbonate of soda is obtained in France from sea-salt. To a solution of one part of salt, three parts of finely pulverised litharge are added, and rather more than half a part of chalk. These are agitated well together, and then set apart: a double decomposition gradually takes place, chlorides of lead and of lime are formed; while the soda, uniting with the carbonic acid set free from the chalk, crystallizes, and is easily separated. In Britain it is obtained in considerable quantity by decomposing sulphate of soda, by means of sawdust and lime in a reverberatory furnace. Sometimes charcoal is employed. The latter method is practised in the west of Scotland, and affords a very pure carbonate of soda. "About 500 cwt. of sulphate of soda and 100 cwt. of charcoal are ground together, and the mixture exposed in a reverberatory furnace until it becomes pasty. It is then transferred into large casks, and lixiviated. The ley is afterwards evaporated and crystallized."[1]

Qualities. — Good impure carbonate of soda is in hard, dry, spongy, sonorous masses of a greyish blue colour, which become covered over with a saline efflorescence when exposed to the air. It should not emit any unpleasant odour on solution; and when applied to the tongue should impress a sharp, alkaline taste.

Use. — Impure carbonate of soda is employed only for yielding the pure carbonate.

Officinal preparation. — *Sodæ Carbonas, L. E. D.*

SODII CHLORIDUM, *Lond.* MURIAS SODÆ, *Edin. Dub.* Chloride of Sodium. Muriate of Soda. Common Salt.

Syn. Muriate de Soude (*F.*), Salzaures Natrum (*G.*), Zout (*Belg.*), Salt (*Dan.*, *Swed.*), Sal commune (*I.*), Sal (*S.*), Mélh (*Arab.*), Poppoo (*Tam.*), Loon (*H.*), Nemuck (*Pers.*), Locnoo (*Cyng.*), Lavana (*Sans.*), Garam (*Malay*), Uyah (*Jay.*), Tarrĕĕke (*Esquimaux.*)

This salt is one of the most abundant productions of nature, being found in almost every country of every quarter of the globe; either existing in mineral springs[2] or lakes[3]; spread in strata under the surface of the ground[4], or rising

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[1] *Duncan's New Edinburgh Dispensatory*, 216.

[2] The salt spring of Luneberg yields 75,600 gallons of brine in twenty-four hours, of which ¼th is saline matter, making the annual produce 55,000,000 lbs. of salt. — *Kirwan's Geo. Essays*, p. 392.

[3] These lakes are generally dry in the summer, being formed by the small streams from the hills settling in the valleys, and dissolving the salt of the soil. There is a lake or valley of this description eighteen miles from Aleppo, called in Arabic *Subkhet al Jibool*, or Valley of Salt; in which the salt is found, in the summer, crystallised from half an inch to two inches thick. — *Russell's Aleppo*, 2d edit. i. 55.

[4] The stratum of rock salt in Cheshire is 50 feet thick. The salt mine of Wiliska, near Cracow in Poland, is 6691 feet long, 1115 feet broad, and 743 feet deep. — *Coxe's Travels*, i. 197.

from it into mountains[1]; and to its presence also the ocean owes its saltness.[2] In all these situations, however, it is generally mixed with earths and other matters; and, therefore, must undergo several processes to bring it to the degree of purity in which it occurs as an article of commerce.

In Cheshire, where the greater part of the salt used in this country is made, the brine is pumped up from very deep wells, and evaporated in wrought-iron pans, which are generally about twenty or thirty feet long and broad, and nine or twelve inches deep; strongly set upon masonry over a large furnace, from which flues proceed under every part of the pan. They are protected from the weather by light pyramidal roofs of boards, sufficiently open, however, to admit of the escape of the steam from the boiling brine. When the brine attains the temperature of 100° Fahrenheit, it grows turbid, and carbonate of lime and of iron are separated. These are partly taken off by skimming, but much of the mass falls to the bottom, and cannot be removed until the first deposition of crystallised salt gives it a sufficient body to enable the workmen to rake it out. After this is carefully done, the evaporation is continued at a boiling heat, when the salt gradually forms, and falls to the bottom of the pan in beautifully white, delicate crystals, which are fished out, as they collect, with wooden vessels, and poured into large wooden, hollow cones, having a hole at the apex, which is undermost. When the salt is sufficiently drained, the cones filled with it are taken to a large room heated by stoves, where they remain until thoroughly dry.[3] In warm climates, the sea-water is evaporated in shallow ponds by the heat of the sun; and in this mode what is denominated bay-salt is made; but in colder countries the evaporation is carried on by artificial heat, in a way similar to the Cheshire process. The crystals of the salt procured by these means are more perfect and pure, the more slowly the evaporation is conducted. Many improved processes have been invented for making culinary salt.[4]

The following table, drawn up by Dr. Henry, shows the components in the different varieties of salt used in this country:—

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[1] Near Cordova, in Spain, is a mountain of common salt 500 feet high, and nearly three miles in circumference.

[2] The average quantity of salt contained in sea-water varies in different latitudes. Between 10° and 20° south, it amounts to rather more than one twenty-fourth; between 18° and 34° north, it is rather less than one twenty-fourth; and at the equator it is nearly one twenty-fifth. — *Thomson's Chymistry*, 4th edit. vol. iv. p. 441.

[3] *Aikin's Dictionary of Chymistry.*

[4] See *Hobart's Engineer and Mechanics' Encyclopædia*, art. Salts.

1000 Parts, by Weight, of the following Salts.		Insoluble Matter.	Chloride of Calcium.	Chloride of Magnesium.	Total earthy Chlorides.	Sulphate of Lime.	Sulphate of Magnesia.	Total Sulphates.	Total Chlorides.	Pure Chloride of Sodium.
For Bay Salt.	St. Ube's[1]	9	trace	3	3	23½	4½	28	—	960
	St. Martin's	12	do.	3½	3½	19	6	25	—	959½
	Olevon	10	do.	2	2	19½	4½	23¾	—	964¼
Brit. Salt from Sea-water.	Scotch (common)	4	—	28	28	15	17½	32½	—	935½
	Scotch (Sunday)	1	—	11½	11½	12	4½	16½	—	971
	Lymington (com.)	2	—	11	11	15	35	50	—	937
	Lymington (cut)	1	—	5	5	1	5	6	—	988
Cheshire Salt.	Crushed Rock	10	0·1/16	0·3/16	0¼	6½	—	6½	—	983¼
	Fishery	1	0·¾	0·¾	1	11¼	—	11¼	—	986¾
	Common	1	0·¾	0·¾	1	14½	—	14½	—	983½
	Stoved	1	0·¾	0·¾	1	15½	—	15½	—	982½

The common salt of commerce, however, still contains small portions of chloride of magnesium, chloride of calcium, and sulphate of lime. To separate these, dissolve the salt in four times its weight of pure water, and drop into the filtered solutions, first, chloride of barium, and then carbonate of soda, as long as any precipitate falls. Filter and evaporate the clear fluid slowly till the salt crystallizes, which is pure chloride of sodium.[2]

Qualities.—Pure chloride of sodium[3] is inodorous: its taste is agreeable, and strictly salt; and, when pure, it is perfectly devoid of any degree of bitterness. It is in regular cubes, which contain no water of crystallisation, and are not affected by exposure to the atmosphere. When it deliquesces, it contains chloride of magnesium. Its crystals decrepitate[4] when heated, and melt in a red heat, losing about two per cent. of their weight; and, in a still greater heat, the salt is volatilised undecomposed in white fumes. Its specific

[1] M. Berthier's analysis differs from that of Dr. Henry. From two specimens he obtained the following results:—Chloride of sodium ·884; sulphate of magnesia ·076; sulphate of lime ·010; water and oil ·030; with a minute portion of sulphate of soda, in 1000 parts. — *Annales des Mines,* xiii. p. 225.

[2] *Thomson's Chymistry,* 4th edit. ii. 377.

[3] The term muriate, or hydrochlorate, of soda is not chymically correct when applied to the dry salt; for in this state it is a compound of chlorine and soda, or a chloride, and becomes a hydrochlorate only when water is added; which, being decomposed, forms hydrochloric acid by giving up its hydrogen to the chlorine, and soda by transferring its oxygen to the sodium or metallic base of that alkali. Dry, pure sea-salt, therefore, is a chloride of sodium, the chlorine being in the proportion of 59·305 to 40·695 of the sodium, according to the analysis of Berzelius.

[4] Decrepitation is produced in two ways: 1. By expansion of the surfaces of crystals that are bad conductors of caloric—namely those of Chloride of Sodium, Sulphate of Potassa, Iodide of Potassium: 2. By giving out aëriform products—such as occur in Bicyanide of Mercury, Tartar Emetic, Bitartrate of Potassa, Acetate of Copper, Nitrate of Baryta.

gravity is 2·126. It is nearly equally soluble in cold and in hot water; rather more than two and a half parts of either being required to dissolve one of salt.[1] It is insoluble in pure alcohol. It consists of 1 eq. of sodium = 23·3, 1 of chlorine = 35·42, equivalent = 58·72; being truly a chloride of sodium. It is decomposed by sulphuric acid and nitric acid.

Medical properties and uses — This salt is tonic and anthelmintic in moderate doses; emetic and purgative in larger, and externally stimulant. In the ordinary mode of using it, the tonic power of salt operates in assisting the process of digestion; and, consequently, taken more freely, it proves useful in dyspepsia, and in correcting the weakened state of the intestines, which favours the propagation of worms. In large doses it is said to check vomiting of blood, and may be used as a purgative, although it is seldom employed.[2] As a local stimulant, its solution in tepid water, in the proportion of ℥ss. or ℥j. to Oj. of water, forms the common domestic enema. It is used also as a fomentation to sprained and bruised parts; and, dissolved in a large proportion of water, it forms the best stimulant general bath, whether used cold, or in a tepid, or in a hot state. To act as a tonic, the dose of chloride of sodium may be from grs. x. to ʒj.; but to operate by stool from ℥ss. to ℥j. is necessary. It should be largely diluted.

Officinal preparation.—*Murias Sodæ siccatum, E. D.*

SODÆ SULPHAS. *Lond. Edin.* Sulphate of Soda.

Syn. Sulphate de Soude (*F.*), Krystallisirtes Schwefelsauress Natrum, Glaubersalz (*G.*), Sale mirabile di Glaubero (*I.*), C'hara Nún, (*H.*).

This salt is found native in combination with oxide of iron, chloride of sodium, and carbonate of soda, and sometimes effloresced on the surface of the soil in the neighbourhood of salt lakes, in Hungary and North America.[3] It is also found effloresced in caves near the villa Mulighin, in the Canton of Argavie; and very often forming part of the contents of mineral saline springs, as those of Cheltenham and of Carlsbad. But the greater part of it used in this country is artificially prepared,

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[1] The following appears to be the solubility of chloride of sodium:—

100 parts of water at	13·89° centigrade dissolve	35·81 parts of the chloride.	
	16·90	35·88	
	59·93	37·14	
	109·73	40·38	*Ure, Chem. Dict.*

[2] The purgative property of sea-water does not altogether depend on this salt, as it contains a large proportion of chloride of magnesium, which is purgative.

[3] To the north of Carlton House, on the river Skatchawan, lat. 53° 20′, is a small lake, on the shores of which, in the summer time, it effloresces in the form of a fine powder, to the depth of two or three inches.—*Franklin's Journey to the Polar Sea*, 4to. p. 506. *Appendix.* Captain Hall also relates, that the valley of Copiapo, on the coast of Chili, is covered with a layer of sulphate of soda, several inches thick. The salt looks like snow upon the ground.—*Journ. in South America*, vol. ii. p. 22.

and chiefly in the large way, during the manufacture of sal ammoniac from sulphate of ammonia and common salt. The London College has a formula also given for its preparation; I shall, therefore, defer the consideration of its qualities and uses till it come under notice among the *Preparations.*

SOLANUM. *Spec. Plant. Willd.* i. 1025.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.

G. 383. *Corolla* wheel-shaped. *Anthers* slightly coalescing, opening by two pores at the apex. *Berry* two-celled.

* *Unarmed.*

Species 15. S. *Dulcamara.*[1] Woody Nightshade, or Bitter-sweet. *Med. Bot.* 3*d. edit.* 240. *t.* 85. *Smith, Flora Brit.* 256. *Eng. Bot.* 565.

Officinal. DULCAMARA, *Lond.* SOLANI DULCAMARÆ, CAULES, *Edin. Dub.* The stalks of Bitter-sweet.

Syn. Douce amère (*F.*), Bittersusstangel (*G.*), Bitterzoit (*Dutch*), Bittersöde (*Dan.*), Quesved (*Swed.*), Psinki Wodne (*Pol.*), Dulcamara (*I.*), Amaradulcis (*S.*), Doçamarga (*Port.*), Solotucha Elsterbeeren (*Russ.*).

This species of solanum is an indigenous shrub, growing in hedges and shaded spots, and flowering in June and July. The root is ligneous: the stem woody, roundish, branched, and climbing sometimes to the height of six or eight feet: the leaves are alternate, on footstalks, entire, smooth, soft, about two inches long and one broad, and of a dull green colour; the lowermost cordate and undivided, and the uppermost halberd-shaped. The flowers are in elegant clusters opposite to the leaves, or terminal, drooping, and having the semblance, but not the structure, of a true cyme: each consisting of a small purplish calyx with blunt segments; a corolla of five, reflected, equally divided, pointed, bright violet-coloured segments, with two green dots at the base, and a longitudinal deeper purple vein through the centre of each segment; and large, erect, almost sessile, lemon-yellow anthers: the berries, which ripen in September and October, are oval, scarlet, very juicy, bitter, and poisonous.[2]

The extreme twigs are the parts employed. They should be gathered in autumn, as at that season they are more powerful; depending perhaps on their being less succulent, and containing more of the peculiar secretion on which the virtues of the plant depend. The soil in which the plant grows also affects its medicinal powers. That grown on a high and dry situation is the best.

Qualities.— The fresh twigs have a peculiar odour, but the dried are inodorous. They have a slightly bitter taste, followed by a sweetness not unlike that of liquorice root, de-

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[1] *Citocatia* of the monastic age.

[2] They excite violent vomiting and purging.

pending probably on an uncrystallisable sugar, with a slight degree of acrimony. Boiling water extracts all their active matter. Scheeler found that they contain citric acid. Their medicinal properties depend on an alkaline principle, which was first procured by M. Desfosses of Besançon[1], and is contained in the Dulcamara in combination with malic acid: it is termed *solanine* or *solania.* It is white, pulverulent, inodorous, and slightly bitter: more soluble in alcohol than in water. It is prepared by precipitating the juice of the berries of the garden night-shade by ammonia; drying this precipitate, and treating it with boiling alcohol. The alkali is deposited as the spirit cools. It is scarcely soluble in water, but very soluble in alcohol and ether. It possesses narcotic properties. Pfaff obtained also another principle, which he termed *picroglycion*, or bitter-sweet. A tincture of the extract is treated with acetate of lead; and after precipitating any excess of the acetate with sulphuretted hydrogen, the fluid is evaporated, and the residue treated with ether. The etherial solution spontaneously evaporated yields the solania. (*Biltz.*)

Medical properties and uses. — Bitter-sweet is diuretic and narcotic. It has been found useful in humoral asthma, dropsy, chronic rheumatism, and in lepra vulgaris and alphos, scabies, and ptyriasis. Willan[2] remarks, that it is not applicable for the cure of lepra nigricans: we can assert that it is not of the least use in acute rheumatism; and we believe of as little in fluor albus and suppression of the menses, in which it has been strongly recommended. When given in too large doses at first, it occasions nausea, vomiting, syncope, violent palpitation, and convulsive twitchings in the eyelids, the lips, and the hands. It therefore requires to be begun with small doses; and even when it is more cautiously administered, if these symptoms occur, the dose must be lessened, and some aromatic conjoined. The usual form under which it is used is that of watery infusion or decoction; but it may be also given in substance pulverised. The dose of the powder may be from x. to xxx. grains, taken in a cupful of milk.

Officinal preparation.—*Decoctum Dulcamaræ*, L.D.

SPERMOEDIA CLAVUS. *Fries' Syst. mycol.* ii. 268.

Nat. Ord. Fungaceæ.

Officinal. ERGOTA, *Lond.* Ergot.

Syn. Ergot de Siegle (*F.*), Secale cornutum (*auct. var.*).

The London College has referred this fungus to Acinula *Clavus* of *Fries' Syst. mycol.*, but there is no such plant in Fries' work, and we are informed by Dr. Lindley that the

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[1] One grain of sulphate of solania will kill a strong rabbit in six hours.

[2] *Description and Treatment of Cutaneous Diseases*, 147.

only species of Acinula known is A. *candicans,* which is found on the rotten leaves of the alder.[1]

The ergot is a morbid production on the grains of the rye. It is a dark-purplish, somewhat cylindrical, angled body, rounded at its extremity, and covered with a powdery substance. Its texture is horny, of a dirty-white colour internally, and when sliced and examined under the microscope, it is found to consist of threads bearing spherical sporules, the whole being consolidated into a compact mass. When the ergot is ground into flour with the rye, and is eaten in bread, it proves poisonous, causing a disease closely resembling dry gangrene.

Qualities. — Ergot, besides the physical characters which we have mentioned, has a slight unpleasant odour; its active properties are taken up by alcohol, and when the tincture is distilled and evaporated it acquires the odour of putrid fish. It loses its activity when kept longer than a year; the more recent it is the better for therapeutical purposes. It should be kept in a closely stopped phial. In large doses, namely, two or three drachms, ergot operates powerfully upon the brain and spinal chord, causing cephalalgia, vertigo, dilatation of the pupils, and drowsiness. The dilatation of the pupils remains often for days after the use of the ergot has been discontinued, but the sight is not affected. The vertigo resembles that of inebriation; it is followed by drowsiness, and is often accompanied with nausea, vomiting, itching all over the body, and a sensation of excessive fatigue. In large doses the operation of ergot is that of a narcotic.

Medical properties and uses. — Ergot is chiefly employed to stimulate the uterus to renewed action in protracted parturition, depending on atony or exhaustion of the uterus. It had been long used by some female midwives, but its employment was first recommended to the profession by Dr. Stearnes, an American physician, and its influence as an excitant of uterine action, in certain states of the uterus, is now almost generally admitted. The most decided proofs of its utility have been published by Bayle (*Bibliothéque Therapeutique*). In 1176 cases of protracted parturition from exhaustion, the ergot terminated the labour safely and promptly in 1051 cases; it failed in 111, and was productive of some slight benefit in 14. When the medicine causes the uterine contractions it generally operates in ten or twenty minutes; the duration of its action varying from half an hour to an hour and a half, with scarcely an interval of cessation. It should not be administered, however, until the os uteri is dilated to a certain

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[1] Flora Med. 8vo., Lond. 1838. p. 624.

extent, nor until, the hand being placed on the hypogastrium, no uterine contraction is felt above the pubis.

Besides urging the uterus to expel the child, ergot may be employed to expel clots, accumulated in the organ, after parturition. It is requisite to avoid its administration, either during parturition or afterwards, where puerperal convulsions are present.

Ergot has been found equally beneficial in puerperal metrorrhagia as in protracted parturition; but Prescott and others contend that it is of no value in metrorrhagia of the unimpregnated uterus. This opinion, however, has been combated by Spargani and some Italian physicians, who have brought forward cases in support of the efficacy of ergot in menorrhagia[1]; and their opinions have been confirmed by the observations of Trousseau. According to the last-mentioned author, less than thirty-six grains produces little or no effect; and when this dose is inactive it should be rapidly augmented to twice the quantity. Its action is always either preceded by, or accompanied with, uterine colic, which may be regarded as the precursor of the salutary influence of the ergot in suppressing the menorrhagia.

As far as regards the action of ergot on the uterus, the following conclusions may be hazarded:—

1. Ergot exerts a powerful but transitory action on the exhausted uterus during parturition.
2. It operates chiefly on the contractile fibres of the organ, and their contraction is always accompanied with pain.
3. It operates upon the nervous centres in the manner of a narcotic.
4. In cases of metrorrhagia the doses should be administered at equal intervals.

Besides the salutary effects derived from ergot in parturition and in metrorrhagia, it has been said to prove beneficial in epistaxis, hæmoptysis, hematuria, and other hæmorrhages; but its influence in such cases is doubtful. The same opinion may be expressed respecting its use in leucorrhœa, in which it has also been vaunted.

Ergot should not be powdered until it is about to be administered. It is most advantageous when it is given in powder; but it has also been prescribed in the form of infusion, in the proportion of ʒ j. of the ergot, bruised, to a pint of distilled boiling water.

The dose of the ergot, in powder, may be from gr. x. to ʒ ss. It may be repeated according to circumstances.

SPIGELIA. *Spec. Plant. Willd.* i. 824.[2]

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[1] *Annali Universali di Medicina*, 1830.

[2] The genus was named after Adrian Spigelius, a celebrated professor of anatomy at Padua.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Spigeliaceæ.
G. 308. *Corolla* funnel-shaped. *Capsules* twin, two-celled, many-seeded.
Species 2. S. *Marilandica.* Perennial worm-grass. *Med. Bot.* 3d *edit.* 178. *t.* 69. *Edin. Phil. Trans.* iii. 151. *t.* 1.
Officinal. SPIGELIA, *Lond. Dub. Edin.* Worm-grass root.
Syn. Spigelie de Maryland Brinailler (*F.*), Spigelie (*G.*), Spigelia (*I.*).

This is a perennial plant, a native of the warmer parts of North America; flowering in July and August.[1] The stems are annual, simple, erect, rough, quadrangular, and rigid; and about seven or eight inches in height. The leaves are opposite, sessile, ovate-lanceolate, quite entire, smooth, and spreading. The flowers are in a solitary spike, with small opposite bractes; the calyx consists of five awl-shaped, persistent leaflets: the corolla is of a bright red colour on the outside, and deep orange within, pentangular above, gibbous at the throat, widening at the base; with the border five-parted; the segments being lanceolate and revolute: the stamens are five, shorter than the corolla, supporting sagittate, converging anthers; the germen is superior, with a round style, jointed below, with the upper part deciduous; the seeds are angular and rugged.

Qualities. — Spigelia root has a bitter taste, which is imparted to boiling water. Feneuille says its active principle resembles the purgative principle contained in some leguminous plants. The root is most active in the recent state.

Medical properties and uses. — This root is purgative, narcotic, and anthelmintic. Its anthelmintic virtues were discovered by the Cherokee Indians, to whom it is known under the name of *unsteetla;* and many opportunities of proving its efficacy in worm cases have occurred both in America and this country. When in the recent state, and given in small doses, it occasionally produces giddiness, dimness of sight, and even convulsions: effects which are attributed to a narcotic principle it possesses, but which its powerful cathartic property prevents from acting when the dose is large. It is usual to administer an emetic previous to the use of it; and to aid its purgative operation by the addition of two or three grains of calomel, or eight or ten of rhubarb. It has been found most powerful in expelling lumbrici; and its vinous infusion is said to have been found useful in intermittents. Dr. Barton recommends it in the protracted remitting fever of infants, which often lays the foundation of hydrocephalus. Spigelia root may be administered either in substance or in the form of aqueous infusion. The dose of the pulverised root is from grs. x. to ʒj., given every night and morning until the worms are expelled.

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[1] It was first cultivated in England in 1694, by Bobart.

SPIRITUS RECTIFICATUS, *Lond.* ALCOHOL FORTIUS, *Edin.* SPIRITUS RECTIFICATUS, *Dub.* Rectified Spirit. Alcohol.

Syn. Eau de Vie rectifié (*F.*), Rectifizirter Weingeist (*G.*), Acquavite rettificata (*I.*), Agua ardiente (*S.*).

This is alcohol nearly in the highest state of concentration in which it can be easily prepared in the large way for the purposes of trade. The London College states its specific gravity to be to that of water as 838 to 1000; the Edinburgh 835, and the Dublin College 844 at a temperature of 52° Fahrenheit, and 840 at 60°. The Edinburgh College names this spirit *alcohol;* but, as directions are given both by the London and Dublin Colleges for the preparation of a still stronger spirit, the name *alcohol*, in their Pharmacopœias, is judiciously retained for the stronger spirit, while that of *rectified spirit* is applied to the present preparation.

All substances which have undergone the vinous fermentation, and in which it is not completely over, contain alcohol ready formed, but combined with colouring matter, extractive, other principles, and water; and are capable of affording it by distillation. The first distillation of wines and fermented liquors afford ardent spirits, such as brandy, rum, arrack, whisky, and gin.[1] These are all mixtures of alcohol, water, and a little oil or resin, which give them their characteristic flavour and colour, and the quantity and nature of which constitute the sole differences in ardent spirits. It is from the re-distillation or rectification of these that rectified spirit is produced.

The process of rectification is exceedingly simple. Any quantity of brandy, malt, spirits, or rum, is diluted with an equal portion of water, and put into an alembic or still, to which a refrigeratory is united, and distilled with a very gentle heat. The first product is the strongest and purest, and, when it has come over to the amount of one fourth of the whole contents of the still, forms the rectified spirit. If the distillation be continued, the spirit continues to come over colourless, but weaker and weaker, till at length it is so watery as not to be inflammable. What remains in the alembic is water, the

[1] We have no historical record of the period when the distillation of spirit was invented: the Greeks and Romans were ignorant of ardent spirits; but the use of the still was well known in the time of Geber, who lived in the seventh century, who describes very accurately the process of distillation by the alembics *per descensorium et filtrum*, in his work, entitled *Liber Investigationis Magisterii.* The first spirit known in Europe was made from grapes, and sold as a medicine both in Italy and Spain, under the name of *Alcohol.* The Genoese afterwards prepared it from grain; and sold it in small bottles at a very high price, under the name of *Aqua Vitæ.* — Vide *Morewood's Essay on Inebriating Liquors.*

colouring ingredients, and any accidental impurities. When the ardent spirits which have been employed contain much

Table of the different Kinds of Spirits.

Names.	Materials from which they are distilled.	Countries producing them.
Agua ardiente	Pulque, the fermented juice of the Agave	Mexico.
Arrack	Coarse palm sugar, named jaggery, fermented with the bark of the Mimosa *leucophlea*: also from rice and the fermented juice of the Palm	India.
Var. Mahwah Arrack	Flowers of the Madhuca tree, Bassia *butyracea*	India.
Tuba	Palm wine	Philippine Islands.
Araka	Koumis, fermented mare's milk	Tartary.
Araki	Dates	Egypt.
Arika	Fermented cow's milk, a variety of Koumis	Tartary, Iceland.
Brandy[1]	Wine, figs, peaches, Persiman apple, mulberries, and sometimes other fruits	Europe, Asia, N. & S. America; where-ever wine is made.
Var. Lau	Rice	Siam.
Rakia	Husks of grapes mixed with aromatics	Dalmatia.
Rossolio	A compound of brandy, Ros-solis, and other plants	Dantzic.
Troster	Husks of grapes, fermented with barley and rye	On the Rhine.
Sekis-kayavodka	Lees of wine and fruit	Scio.
Geneva[2] Hollands	Malted barley and rye, rectified on Juniper berries	Holland.
Var. Gin[3]	Malted barley, rye, potatoes; rectified with turpentine.	England.
Goldwasser	Wheat, barley, and rye, rectified with aniseeds, cinnamon, and other spices	Dantzic.
Kirchwasser	Machaleb cherry	Switzerland.
Maraschino	Macarska cherry	Zara, capital of Dalmatia.
Rum[4]	Cane sugar and molasses	West Indies and South America.
	Maple sugar	North America.
Var. Slatkaia trava	A sweet grass	Kamschatka.
Show-choo	The lees of Mandarin, a wine made from boiled rice	China.
Whisky[5]	Malted and raw barley, rye, oats, and potatoes	Scotland & Ireland.
———	Sloes	South of France.
Y-wer-a	The root of the Teeroot, baked, pounded, and fermented	Sandwich Islands.
Vino meresel	Distilled from Palque, the fermented juice of the Agave *Americana*	Mexico.

[1] The best brandy is that of Cognac, the next of Bordeaux and Rochelle.
[2] Named from *genèvre*, the French for juniper.
[3] The quantity made in England annually exceeds 3,000,000 gallons.
[4] The appellation rum is supposed to be derived from the terminal syllable of the word *saccharum*; but the native Americans call this liquor rum.
[5] 2,499,880 gallons were distilled in Scotland, in 1822; 1,341,978 gallons of which were sent to England, unrectified, for making gin and compounds. In the

oil, the distillation requires to be repeated, and generally with the addition of alkali, lime, or other articles, before the empyreumatic flavour can be completely destroyed. When alkali is used, the spirit has an urinous taste; to free it from which it is again distilled with the addition of a little alum and charcoal, the acid of the former of which attracts the small portion of alkali which the spirit held in solution. Malt spirits, when properly rectified, yield as pure and as strong rectified spirit as brandy.[1]

The strength of spirits is ascertained in common by several methods. The taste, and the degree of frothiness or size of the bubbles formed when spirit is shaken, is the least correct method; and the burning the spirit, and observing the quantity of water which remains after the combustion, although more accurate, is liable also to error from the impossibility of performing the experiment always under the same circumstances. Pure alcohol[2] leaves no water; rectified spirit of moderate strength, 25 per cent.; French brandy, 56; and common malt liquor, 65; and the like. Another test is the pouring a few drops of the spirit on gunpowder; but this is also very incorrect, and indicates two degrees of strength only; that which fires gunpowder, and that which cannot fire it. A more accurate test than any of these, and sufficient for common purposes, is to shake the spirit in a phial, with very dry, pure carbonate of potassa, and observe the quantity of water attracted by the alkali, which indicates its strength. But the only certain mode of ascertaining the relative strength of spirits, is by determining the specific gravity of the spirit at a given temperature. Thus, at 60° Fahrenheit the specific gravity of rectified spirit is ·835, at 65° it is ·83362, and at 70° the gravity of the same spirit is ·83124; while the gravity of the proof spirit of the London College at the same degrees of temperature is ·920, ·92794, and ·92580 (see Table under the article *Alcohol* among the Preparations); the weakest spirit having the greatest specific gravity, and this diminishing as

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same year, the quantity made in Ireland was 4,318,012 gallons. The name *whisky* is supposed to be derived from *usque*, the two first syllables of *usquebaugh*, the name it originally had in Ireland, whence the Scots appear to have derived their knowledge of it. In Ireland it was also called *buil-ceaun*, which literally signifies *madness of the head*. The best Scotch whisky is *Glenlivet*; the best Irish, *Ennishowen*.

[1] Besides those spirits which are distilled from wines, grain, and fruits, and the other articles mentioned in the Table, page 672., the Afghanistans make also an intoxicating liquor from ewes' milk; and at Kamschatka a powerfully inebriating liquor is prepared from a species of mushroom, named Muchumer.

[2] By the term *pure* or *absolute alcohol* is meant alcohol of a specific gravity of ·796 at 60° Fahrenheit, the strongest which can be procured.

the temperature increases.[1] The usual mode of ascertaining the relative gravity of different spirits is by the hydrometer[2], of which there are different kinds in use. For ordinary purposes, the relative strength of spirits may be known by weighing the sample to be tried in a phial capable of holding exactly 500 grains of distilled water. An equal bulk of rectified spirit weighs 418 grains, and of proof spirit 465: hence the number of grains above or below these sums will indicate the relative strength of the spirit.

Qualities. — Pure rectified spirit has a fragrant odour, and a hot, highly pungent taste. It is colourless; always fluid; cannot be congealed at any known degree of cold; evaporates speedily at the ordinary temperature of the atmosphere; boils at 163° Fahrenheit; and is extremely inflammable, burning with a blue, lambent flame without any sensible smoke. Like alcohol, it combines with water in every proportion, and is not rendered turbid by it; and on account of its affinity for water, precipitates many of the neutral salts from their aqueous solutions. It is capable of dissolving many saline bodies, and is the proper solvent of the greater number of the proximate principles of vegetables: its constituents are 85 of pure alcohol and 15 of water, in 100 parts, when its specific gravity is ·838, at a temperature of 60° of Fahrenheit; but 83 only of pure alcohol, and 17 of water, when it is ·840 as designated by the Dublin College.

Medical properties and uses. — Rectified spirit is a very powerful stimulant. In its undiluted state it is never exhibited as a remedy; and is employed only for forming the diluted spirit, and as a pharmaceutical agent.

Officinal preparations. — *Alcohol*, L. D. *Spiritus Camphoræ*, E. *Spiritus Ammoniæ*, L. D. *Spiritus Ammoniæ aromaticus*, L. *Spiritus Ammoniæ fœtidus*, L. *Spiritus Cinnamomi*, L. *Spiritus Menthæ Piperitæ, Pulegii, et M. Viridis*, L. D. *Spiritus Lavandulæ*, L. E. D. *Alcohol Ammoniatum*, E. *Tinctura Aloës*, L. D. *Tinctura Assafœtidæ*, L. E. D. *Tinctura Benzoini composita*, L. E. D. *Tinctura Castorei*, L. E. D. *Tinctura Guaiaci*, L. E. D. *Tinctura Kino*, L. *Tinctura Myrrhæ*, L. E. D. *Tinctura Saponis Camphorata*, E. *Tinctura Saponis et Opii*, E. *Tinctura Iodinii Comp.*, L. D. *Tinctura Acetatis Ferri*, D. *Tinctura Acetatis Zinci*, D. *Tinctura Moschi*, D. *Tinctura Ferri Ammonio-chloridi*, L. D. *Tinctura Muriatis Ferri cum Oxydo rubro*, D. *Liquor Hydrargyri Bichloridi*, L.

SPIRITUS TENUIOR, *Lond.* ALCOHOL DILUTUS, *Edin.* SPIRITUS TENUIOR, *Dub.* Weaker Spirit. Diluted Alcohol. Proof Spirit.

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[1] Five pints of rectified spirit are reduced to proof spirit by the addition of three pints of distilled water, at a temperature of 62°.

[2] For a description of this instrument, see Part I.

of comparative purity, being mixed with a white earth only, from which it is separated by sublimation, and the sulphur thus freed is melted and cast into moulds, forming the roll sulphur of commerce. It is imported into Britain chiefly from Sicily[1] and Naples; but a large proportion of what is used in this country is obtained from the roasting of pyrites. At the Parys mines in Anglesea were works for this purpose on a large scale; where, in working the copper pyrites, the sulphur volatilized in the roasting was collected in chambers, which were connected with the domes of the furnaces by means of horizontal flues. Each chamber had a door, by means of which it was cleared of the sulphur once in six weeks. This is the general mode of obtaining sulphur from pyrites; and thus procured, it is in rough, pulverulent, spongy crusts, of a dirty greyish-yellow colour. In order to purify it, the crusts are broken and thrown into a boiler, in which it melts; and after the impurities are separated by skimming and subsidence, it is cast into cylindrical moulds, forming roll sulphur; or into cones about two feet high, which form the loaf sulphur of commerce.[2]

The common English roll sulphur is said often to contain a full fifteenth part of orpiment, while the Sicilian sulphur contains seldom more than 3 per cent. of a simple earth; and therefore is justly preferred. Both of them are purified in the large way by conducting the vapour of melted sulphur into close chambers, where it concretes in the form of a fine powder: but for medicinal use, that which is sublimed by heating in a sand-bath, an earthen cucurbit, charged with roll sulphur, and conveying the vapours to be concreted into a set of alludels placed round the cucurbit, is to be preferred. Prepared in either mode, it is the *sulphur sublimatum*[3] of the Pharmacopœias. Sulphur, especially in the roll, contains many impurities, the amount of which may be detected by boiling 100 grains in four ounces of oil of turpentine, pouring off the solution while hot, and repeating the boilings, until no more is dissolved. The residue indicates the amount of the impurities.[4]

Qualities.—*Roll sulphur* is a crystallized, brittle, solid body of a greenish-yellow colour, has a peculiar well-known odour when rubbed or heated, and is insipid. It breaks from the

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[1] In Sicily it is procured from *Samattino, Gallati, Trabria, Pentellaria, Licati, Salato, Palmo, Tavara, Girgenti,* and *Falconara.* The Harz yields 954 cwt. of sulphur annually.

[2] The *sulphur vivum* of the shops is the impure dregs of this process.

[3] Θειον πεπυρουμενον Dioscoridis.

[4] *Brande's Manual,* p. 178.

heat of the hand, when held in it for a short time; and being a non-conductor of electricity, becomes negatively electrical when rubbed. Its specific gravity is 1·99. *Sublimed sulphur* is in the form of a very bright yellow powder, and contains a minute portion of sulphuric acid, from which it can be separated by washing it with water. Sulphur volatilizes under 220° Fahr., at which it fuses; and what is singular, by increasing the heat to 320°, it becomes thick and viscid, and if then poured into water, it assumes a red colour and ductility like wax [1]; while its specific gravity is increased to 2·325. Fused sulphur crystallizes as it cools. At 560° it becomes an elastic fluid. When heated in the air it inflames at 300°, and burns with a pale blue flame, emits pungent suffocating vapours, and becomes acidified; the acid is the sulphurous, for the sulphuric is never formed unless moisture be present. It is insoluble in water; but soluble in a small degree in alcohol, ether, and oils; and combines with the alkalies, and many of the earths and metallic substances. The experiments of Davy led to the supposition that sulphur is a triple compound of oxygen, hydrogen, and a peculiar base[2], but it is still generally regarded as a simple substance. The equivalent of sulphur is 16·1.

Medical properties and uses.—Sulphur is laxative, and a stimulating diaphoretic. From the gentleness of its operation on the bowels, it is one of the best means of keeping them lax in hæmorrhoidal affections; and the diaphoresis which it at the same time excites has rendered it serviceable in chronic rheumatism and catarrh, and in atonic gout, rickets, asthma, and other pulmonary affections not attended with acute inflammation. It is supposed that it combines with hydrogen in the stomach. It manifestly transpires through the skin, perhaps, however, in the state of sulphuretted hydrogen, which may be the cause that silver is blackened when kept in the pockets of those who take sulphur. It is specific in scabies and some other cutaneous affections, in which it is applied externally, and taken internally, at the same time.

The dose may be from ℈j. to ʒii., mixed into an electuary with syrup or treacle, or it may be given in milk. To promote its purgative power it may be combined with bitartrate of potassa; and in hæmorrhoidal cases with magnesia.

Officinal preparations.—*Sulphur lotum,* E. D. *Unguentum Shulpuris,* L. E. D. *Unguentum Sulphuris compositum,* L.

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[1] In this state it is kneaded under the water, and used for receiving the impressions of seals and medals.

[2] *Phil. Trans.* 1809.

SUS. *Syst. Nat. Gmelin*, i. 217.

D. 1. Vertebrata. *Cl.* 1. Mammalia. *Ord.* 6. Pachydermata. *Cuvier.*

G. 35. *Fore-teeth* four in the upper jaw converging, and six prominent in the lower jaw. *Tusks* two shorter in the upper jaw; and two in the under jaw displayed. *Snout* truncated, prominent, movable. *Feet* cloven.

Species 1. Sus *Scrofa.*[1] The Hog. *Jonst. quadr.* 99. *t.* 47.

Officinal. ADEPS SUILLUS, *Edin. Dub.* Fat Hog's lard.

Syn. Sain doux (*F.*), Schweineschmalz (*G.*), Swinster (*Swed.*), Szmalee (*Pol.*), Lardo (*I.*), Pingue (*S.*), Púnnie Colupoo (*Tam.*), Booboo (*Begharmi*).

The hog is too well known to require a particular description. It is an inhabitant of the greater part of the temperate regions of the globe, the wild and the domestic being varieties of the same species; and of both there are several sub-varieties. The period of gestation of the sow is four months, and the offspring numerous, occasionally exceeding twenty at a litter, which the boar sometimes devours. The hog does not shed its teeth, and seldom lives beyond twenty-five or thirty years. It is much infested with vermin; and is subject to several diseases, particularly hydatid dropsy, scrofula, and scabies. Its food is of a vegetable nature; but it is asserted that pepper kills it. As an article of diet, the flesh of the hog, when the animal has been castrated and properly fed[2], is very palatable, and not unwholesome; and when salted keeps better than most other meats. But the frequent use of pork is said to favour obesity, and occasions disorders of the skin, particularly in the sedentary. The lard, which is the officinal part of the hog, is obtained chiefly from the flank of the animal. To free it from the membranes and vessels, it is cut in small pieces, then very well washed in water, until the water comes off colourless, and afterwards melted with a very gentle heat in a shallow vessel, continued on the fire till the whole of the water is evaporated. While in the melted state, it is run into bladders, in which it concretes; and is thus brought to market.

Qualities. — Lard is inodorous, tasteless, and white; soft, and nearly semifluid. Exposed to a heat of 97° it melts, and concretes again when cooled. It is insoluble in water, alcohol, and ether: but is dissolved by the strong acids, being at the same time decomposed; and, like the fixed oils, it combines with the alkalies and forms soap. It is oxidized, if, when

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[1] Ὗς, Aristotle.

[2] The qualities of the flesh depend much on the diet of the animal. Pork fed at a flour mill is always good; and Russel says, that which is fed near Aleppo on liquorice root, which grows in great abundance in the desert, is fat, delicious, and remarkably digestible.

melted, a little nitric acid be stirred into it; and assumes a greater degree of firmness, with a yellow colour. By destructive distillation it affords results very similar to those obtained from the analysis of fixed oil; and appears to be a compound of oxygen, hydrogen, and carbon, in unknown proportions. From the experiments of Chevreul, it appears to consist of a mixture of two distinct oily substances; one of which is solid at the usual temperature, and has been named by him *stearin;* and the other liquid, which he has named *elaïn.* The proportion in 100 parts of lard is, of stearin 38, elaïn 62 parts.[1] When lard is long exposed to a warm air, it becomes yellow, emits a fœtid odour; and, owing to oxygen being attracted from the atmosphere, the sebacic acid is formed. This state of rancidity may, in some degree, be removed by washing it with very pure, soft water; which during the operation becomes acid, and reddens litmus paper.

Medical properties and uses. — Lard is emollient; and owing to its softness and unctuosity is preferable to fat as a friction, but it is seldom used for this purpose; and is chiefly employed in the formation of ointments.

Officinal preparation. — *Adeps preparata,* L. D.

TAMARINDUS. *Spec. Plant. Willd.* iii. 577.

Cl. 16. *Ord.* 1. Monadelphia Triandria. *Nat. ord.* Leguminosæ.

G. 1250. *Calyx* four-parted. *Petals* three. *Nectary* of two short bristles under the filaments. *Legume* pulpy.

Sp. 1. T. *Indica.*[2] The Tamarind-tree. *Med. Bot. 3d. edit.* 448. *t.* 161. (Balam-pulli) *Rheede, Hort. Malab.* i. 39. *t.* 23.

Officinal. TAMARINDUS, *Lond.* TAMARINDI INDICÆ FRUCTUS, *Edin.* LEGUMINIS PULPA, *Dub.* The pulp, or preserved fruit of the Tamarind.

Syn. Tamerins (*F.*), Tamarinden (*G.*, *Dutch*), Tamarindo (*I.*, *S.*), Tamarinho (*Port.*), Poollie (*Tam.*), Ambala (*Cyng.*), Timir hindee (*Pers.*), Assam Jaba (*Malay*), Umblie (*H.* & *Arab.*), Amlica (*San.*), Kamal Assam (*Jav.*).

This tree is a native of the East and West Indies, of Arabia, and Egypt. It is a large, beautiful, spreading tree.[3] The leaves are abruptly pinnate, composed of sixteen or eighteen pairs of sessile leaflets, half an inch only in length, and one sixth of an inch broad, of a bright green colour, downy, oblong, entire, and obtuse. The flowers are in loose bunches of five or six, which come out from the sides of the branches; the calyx is of a straw-yellow colour, and deciduous: the petals are also yellowish, and beautifully varie-

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1 *Annales de Chimie*, t. xciv. p. 129.

2 Ὀξυ φοίνικα Nicolai Myrepsici, the last of the Greek physicians.

3 The natives of India think that it is dangerous to sleep under a tamarind-tree during the night.

gated with red veins; ovate, concave, acute, indented, and plaited at the edge; and the filaments purplish, bearing incumbent, brownish anthers: the pods are thick, compressed, and of a dull brown colour when ripe; those from the West Indies are from two to five inches long, with two, three, or four seeds; those from the East Indies are twice as long, and contain five, six, or seven seeds: the seeds in both are flat, angular, shining, and lodged in a dark, pulpy matter.

In the West Indies, the pods are gathered in June, July, and August, when fully ripe; and the fruit being freed from the shelly fragments, is placed in layers in a cask, and boiling syrup poured over it till the cask is filled; the syrup pervades every part quite down to the bottom, and when cool the cask is headed for sale.[1] The East India tamarinds are darker coloured and drier, and are said to be preserved without sugar. When tamarinds are good, they are free from any degree of mustiness; the seeds are hard, flat, and clean: the strings tough and entire; and a clean knife thrust into them does not receive any coating of copper. They should be preserved in closely covered jars.

Qualities. — Tamarinds are inodorous, and have an agreeable, acid, sweetish taste. According to the analysis of Vauquelin, the pulp contains, independent of the sugar with which it is mixed, bitartrate of potassa, gum, jelly, citric acid, tartaric acid, malic acid, and a feculent matter. The acid taste chiefly depends on the citric acid, the quantity being greater than that of the other; ℥xvj. of the prepared pulp containing ℥jss. of citric acid, but only ʒxij. of tartaric acid, ℥ss. of bitartrate of potassa, and ʒss. of malic acid.

Medical properties and uses. — Tamarind pulp is refrigerant, and gently laxative. The simple infusion of the pulp in warm water, or a whey made by boiling ℥ij. of it in two pints of milk, and straining, form very grateful, refrigerant beverages, which are advantageously used in febrile diseases. The dose of the simple fruit required to act upon the bowels is so large, that it is seldom given alone as a purgative, but is generally combined with cassia or manna, the action of which it augments; or with such of the neutral purgative salts as are not decomposed by it; which is the case with those that have potassa for their base, and are therefore incompatible in mixtures with this fruit. It forms an agreeable addition to infusion of senna; but the purgative power is weakened by it.

Officinal preparations. — *Infusum Tamarindi cum Senna,* E. D. *Electuarium Sennæ,* L. D.

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[1] *Long's Jamaica,* iii. 729.

TANACETUM. *Spec. Plant. Willd.* iii. 1809.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Compositæ.
* *Discoid.*

G. 1472. *Receptacle* naked. *Pappus* sub-marginate. *Calyx* imbricate hemispherical. *Calyx* rays obsolete[1], trifid.

Species 18. T. *vulgare.*[2] Common Tansy. *Med. Bot. 3d edit.* 67. *t.* 27. *Smith, Flora Brit.* 862. *Eng. Bot.* 1229.

Officinal. TANACETI VULGARIS FLORES FOLIA, *Edin.* TANACETUM VULGARE; FOLIA, *Dub.* The leaves of Common Tansy.

Syn. Tanassie (*F.*), Rheinfarn (*G.*), Wormkruid (*Dutch*), Rhreinfan (*Dan.*), Renfana (*Swed.*,) Kiviat wrotyczowy (*Pol.*), Tanaceto (*I.*), Atanasia (*S.*), Tanasia (*Port.*), Dikaja riabina (*Russ.*).

This is an indigenous, perennial plant, growing on hills, and by the sides of roads and fields; flowering in July and August; but it is generally cultivated for medicinal and culinary purposes. The root is creeping, sending up stiff, erect stems, about two feet in height, leafy, obscurely hexagonal, and striated; with alternate leaves, doubly pinnatifid, acutely cleft, somewhat downy on the under side, eared at the base, and embracing the stem. The flowers are in terminal, dense corymbs, of a bright yellow colour, and flattish: the leaflets of the calyx are obtuse, with a dry scaly margin: the florets are numerous; those of the disc hermaphrodite and five-cleft, those of the margin female and trifid: the seeds are small, uniform, inversely pyramidal, pentagonal, ribbed, of an ash-colour, and crowned with a narrow marginate membraneous pappus.

Qualities. — Tansy has a strong, peculiar, fragrant odour, and an acrid, bitterish taste, somewhat resembling that of camphor. These qualities it yields both to water and alcohol; and in distillation with water affords a greenish-yellow essential oil, which has in perfection the odour of the plant, and probably contains camphor.

Medical properties and uses. — The leaves and flowers of tansy are tonic and anthelmintic. It was formerly regarded as a powerful remedy in intermittants, dropsy, hysteria, and obstructed menstruation; but experience, and the knowledge of better remedies, have set aside its use in these diseases. An infusion of the whole herb in boiling water has been highly extolled as a preventive of the return of gout[3]; but it is now scarcely ever used, except as an anthelmintic for expelling lumbrici, to which it has certainly some pretensions. The dose of the leaves in powder is from ℈j. to ʒj., twice a day.

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[1] Radius *calidiore æstate prodit.* *Willdenow*, l. c.
[2] Αρτεμισια λεπτοφυλλος Dioscoridis.
[3] Clarke, *Essays Physical and Literary*, iii. 438.

TRITICUM. *Spec. Plant. Willd.* i. 476.

Cl. 3. *Ord.* 2. Triandria Monogynia. *Nat. ord.* Graminaceæ.

G. 152. *Calyx* two-valved, solitary, subtriflorous. *Flower* somewhat obtuse.

* *Annual.*

Species 2. Triticum *hybernum*[1], Winter Wheat. *Gærtner de Fructibus.*

Officinal. FARINA. AMYLUM, *Lond. Edin.* TRITICUM; SEMINUM FARINA, *Dub.* Wheat flour. Starch.

Syn. Farine du froment, Amidon (*F.*), Weitzenmehl, Kraftmehl, Staerhe (*G.*), Abgoon (*Arab.*), Neshasté (*Pers.*) Geeboonkaheer (*H.*), Farina di Frumento l'Amido (*I.*), Acemite, almidon (*S.*), Godumbay mao (*Tam.*), Imno (*Begharmi*).

The country whence this valuable grain originally came is unknown; but it is certain that Sicily was the part of Europe where it was first cultivated. It will not vegetate beyond the 62° of northern latitude. It has two sets of roots; one set proceeding directly from the seed, and the other from what is denominated the *corona* of the plant, about two inches above the first: the *coronal* roots do not shoot till spring-time, and collect more nutriment than the *seminal* roots[2]; the ears or spikes are long, with the grain lodged in four rows, and imbricate: the chaff smooth, bellied, and terminated by very short awns, distinguishing it from spring wheat (*triticum æstivum*) which has awns three inches long. Many varieties of wheat are cultivated in this country, of which the *white Dantzic* is considered the best. The grain is small and translucent, and yields flour which makes more bread in proportion to the quantity of flour than that of any other variety of wheat. After the operation of grinding, the farinaceous part of the seed is separated, by means of cloth sieves, into several distinct portions, of various degrees of fineness: but the whole may be resolved into two: 1. *flour*, which constitutes more than two thirds of the whole; and, 2. *bran*, which consists chiefly of the husks of the seed.

Starch is manufacured by steeping either entire or coarsely bruised wheat in cold water, until it swells, and yields a milky juice when squeezed. It is then subjected to pressure in coarse bags placed in vats filled with water; and when all the milky juice is obtained, the bags are removed, and the fecula deposits itself. In a short time the supernatant liquor ferments, and alcohol and acetic acid are formed in it. The whole is now put into tubs called frames, in which the impure fecula is allowed to subside: and after the water is poured off, the upper part of the sediment which last subided being dirty and discoloured, is scraped off from the starch below; this is

[1] Πυρος χειμος πορομμενος *Dioscoridis.*

[2] *Hunter's Georgical Essays*, Essay v.

then repeatedly well washed, pressed in cloths, and dried by a gentle heat, during which it cracks into small columnar masses, and is the finest white starch of the shops.[1]

Qualities. — *Flour* is inodorous and nearly insipid. Water with which it has been macerated acquires an opaline colour and a sweetish taste; affords precipitates with infusion of galls and the strong acids, and rapidly becomes sour. It appears to contain gluten, sugar, gum, albumen, and phosphate of lime: besides fecula or starch that remains insoluble. According to Vogel, the constituents of flour are, in 100 parts fecula 68, gluten 24, saccharine gum 5, albumen 1·50. The action of these principles on each other, when flour is kneaded with water, and yeast added to the mass, excites the panary fermentation, and produces bread, a little salt being added to give it sapidity. The large proportion of gluten in wheat flour renders it fitter for this purpose than any other kind of flour. During the process, a large quantity of carbonic acid gas is evolved, which swells up the mass, and gives it the sponginess and lightness that characterize well-baked bread.[2] For the purpose of baking bread a heat of 488° is required. When flour has been long kept, it becomes musty, and undergoes the putrefactive fermentation, in which state the bread made with it is very unwholesome. Flour is fit for making bread only when all its constituents are entire; and as gluten is the most susceptible of decomposition among them, the ascertaining its presence is a proof of the goodness of the flour. M. Taddei has taught us that guiaic is a test of the presence of gluten, by striking with it a beautiful blue colour: flour, therefore, which exhibits this colour when rubbed with guiaic and a few drops of vinegar, may be pronounced good.

Starch is inodorous and insipid: in white columnar masses which are easily reduced to powder. It is insoluble in alcohol, ether, and cold water; but in the latter it falls into powder. Boiling water dissolves it, forming an insipid, inodorous, semi-transparent, opaline, gelatinous-like paste, which becomes brittle and opaque, when spread out in a dry air: but when exposed, without being spread out, it separates into a watery fluid, and an opaque paste; sours, and becomes mouldy. Alcohol precipitates starch white and tough from its solutions; acetate of lead and infusion of galls also throw it down, but the precipitate formed by the latter is redissolved by heating

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[1] The ordinary blue starch, which is coloured with a solution of smalt and alum in water, is unfit for medicinal uses. The Chians first made starch.

[2] The method of making leavened bread was probably invented by the Egyptians; for it appears that the Israelites were acquainted with it after they sojourned in Egypt, but not before. It was known to the Greeks during the Trojan war, but the use of yeast or *barm* was discovered by the ancient Gauls.

the liquid to 120°. Although potassa dissolves starch, yet the solution of it is not altered by potassa, carbonate of potassa, nor ammonia; but a solution of potassa in alcohol, and a solution of sulphuret of potassa in alcohol, both produce precipitates. From the produce obtained from distilling starch *per se*, it appears to be a ternary compound of carbon, oxygen, and hydrogen.

Medical properties and uses. — The utility of *bread* as an article of diet requires no particular notice.[1] As a medicinal agent it is used for forming poultices, cataplasms, and for giving bulk and form to very active medicines which require to be given in minute doses, in the solid state, or as pills. When toasted and infused in water, it gives a pleasant flavour to the fluid, and renders it more acceptable as a diluent in febrile diseases, and as the ordinary beverage of the dyspeptic. *Starch* is less nutritive than bread, but is, perhaps, more digestible. It forms the greater part of the nutritive matter of the different farinaceous substances which are in general use as the diet of the sick, such as sago[2], salep[3], tapioca[4], arrow-root[5], and gruel, which are only different modifications of

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1 Wheat flour is almost exclusively used for this purpose in England, part of Scotland, France, a part of Germany, Hungary, the Crimea and Caucasus, and some part of the middle of Asia. It is used also for the same purpose, but not so exclusively, in Spain, Portugal, Italy, Greece, Persia, Northern India, Arabia, Egypt, Nubia, Barbary, the Canary Islands, North America, the Brazils, Buenos Ayres, Chili, the Cape of Good Hope, and the temperate zone of New Holland. Rye, barley, and oats, usurp its place in many parts of the North of Europe; rice in the East Indies, China and Japan, in Asia and Africa, in the torrid zone; and maize in part of America and of Africa. Beside these grains, yams, casava, batatas, the banana, doura (*singhum*), sago, the bread-fruit, some species of arum, chenopodium, quinoa, acrastichum *furtum*, and arachis *hypogæa*, are used in different parts of the globe as substitutes for bread. *Schouw on the Geographic Distribution of the Gramineæ.*

2 Sago is the pith of various species of palms. One of these, the sagu-tree of Asia, Metroxylon *sagu* (Roxburgh), when fifteen years old will sometimes yield 600 weight of Sago. It has been calculated, that one English acre of land will grow 435 sagu trees; which would yield 120,500 lbs. avoirdupois of sago, or 8000 lbs. yearly; a produce triple that of wheat. *Hist. of the Ind. Archip.* i. p. 357.

3 Salep is prepared from the bulbs of the Orchis *mascula.* The bulbs are first dipped in hot water and the skin rubbed off; after which, they are placed on a tin plate, and put into a heated oven for ten minutes, and, lastly, dried in the sun. By this process, they acquire the appearance of horn, and, when pulverized, form the salep of the shops.

4 Tapioca is prepared from the roots of the Iatropha *manihot.* The roots are first freed from the rind: and then, are either held to a large wheel, which, on being turned round, soon reduces them to a fine pulp, or they are grated. The pulp is next put into bags, and pressed, to squeeze out the moisture, which contains a poisonous principle, and afterwards repeatedly washed. It is then pressed through plates full of round holes to granulate it; and, lastly, dried by means of heat in large flat pans.

5 Arrow-root is the fecula of the tubers of Maranta *arundinacea.* The powder is prepared from roots of a year old, which, after being well worked, are beaten,

starch. The solution of starch is employed medicinally as a demulcent; but as it is very readily acted on by the stomach, it cannot be of much service in involving acrid matters in the intestines when taken by the mouth. In the form of enema, however, it is often and advantageously used for allaying the effects of acrid bile on the coats of the rectum in bilious diarrhœa and dysentery; and for sheathing the rectum in cases of abrasion, and inflammation of the gut. It is the common vehicle for the exhibition of opium per anum.

Officinal preparations. — *Mucilago Amyli,* E. D. *Cataplasma fermenti cerevisiæ,* D.

TUSSILAGO. *Spec. Plant. Willd.* 1962.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Compositæ.

G. 1483. *Receptacle* naked. *Pappus* simple. *Calyx* scales equal, as long as the disc, submembranaceous. *Corolla* female. *Florets* ligulate, toothless.

Species 12. T. *Farfara.*[1] Common Coltsfoot. *Med. Bot. 3d edit.* 45. *t.* 18. *Smith, Flora Brit.* 878. *Eng. Bot. t.* 429.

Officinal. TUSSILAGO, *Lond.* TUSSILAGINIS FARFARÆ FOLIA ET FLORES, *Edin.* TUSSILAGO; FOLIA, FLORES, *Dub.* Coltsfoot leaves and flowers.

Syn. Tussilage; Pas d'Ane (*F.*), Huflattisch (*G.*), Hoefblad (*Dutch*), Tassilagem (*Port.*), Dwoje lisknik (*Russ.*), Farfara (*I.*), Una de cabello (*S.*).

Coltsfoot is an indigenous perennial plant, growing in moist, marley, and clayey soils. It flowers in March and April, and the leaves appear in May and June. The root is long and diffusely creeping, and sends up stems or scapes destitute of leaves, erect, five or six inches high, simple, unifloral, tomentose, with sparse, smooth, scale-like bractes of a brownish-pink colour, lying close to the stem. The flower droops before it blows, but afterwards becomes erect, and is of a golden-yellow colour: the calyx is composed of linear, trinerved, plane, smooth, purplish scales, the length of the disc, equal, uniform, and finely reflex; the flowrets of the ray are numerous, spreading, linear, twice the length of those of the disc, with a more slender stigma: the seeds are smooth, more frequently abortive, particularly in the disc; with the seed-down sessile, rough, white, and shining; the receptacle is pitted, flat at first, but finally convex. The leaves appear

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and the fibrous part separated from the pulp. The farinaceous pulp is then thrown into a fresh quantity of water, and stirred until it becomes milky, when the fluid is passed through a sieve, and left at rest until the fecula is deposited. The supernatant fluid is now poured off, and the starch, after being well washed, is dried in the sun. In this state it is brought to Europe, and sold under the name of Indian arrow-root.

[1] Βηχιον Dioscoridis. The name is derived from βηξ, *tussis,* whence *tussilago;* showing the early opinion of the pectoral virtues of this plant.

after the flower, are radical, petiolate, erect, cordate, angled and toothed; smooth, green above with reddish veins, but underneath white and woolly.

The leaves are more frequently employed than the flowers, and should be gathered and dried when they are fully expanded, before they have attained their greatest magnitude.

Qualities. — The dried leaves are inodorous, and have a rough, mucilaginous taste. The mucus they contain is yielded to water by coction, and evolves by the boiling a peculiar odour.

Medical properties and uses. — Tussilago is demulcent, and has been regarded as expectorant from the earliest ages, having been smoked through a reed in the days of Dioscorides, with a view of relieving the chest from accumulated mucus in catarrh, asthma, and phthisis. It is still used as a demulcent in catarrhal and phthisical affections; but very little reliance is placed on its powers.[1] Cullen thought he perceived good effects result from the use of the expressed juice of the recent leaves in scrofula; but his observations have not been generally confirmed.[2]

The decoction of the leaves is the usual form of exhibiting tussilago. A handful of the leaves is boiled in O ij. of water to O j.; and the decoction after being strained is sweetened with sugar-candy or syrup. The dose is a teacupful.

VALERIANA. *Spec. Plant. Willd.* i. 175.

Cl. 3. *Ord.* 1. Triandria Monogynia. *Nat. ord.* Valerianeæ.
G. 75. *Corolla* monopetalous, gibbous on one side of the base, superior. *Seed* one.
* *valerians, with a single downy seed.*
Species 6. V. *sylvestris.* Officinal, or great Wild Valerian. *Med. Bot. 3d edit.* 77. *t.* 32. *Smith, Flora Brit.* 38.
Officinal. VALERIANA, *Lond.* VALERIANÆ OFFICINALIS RADIX, *Edin. Dub.* Wild Valerian root.

Syn. Valériane (*F.*), Wilde Baldrianwurzel (*G.*), Wilde Valeriaan (*Dutch*), Wändelrot (*Swed.*), Kettull gunnung (*Jav.*), Valeriana Silvestre (*I.*), Valerian officinal (*S.*), Balder an (*Russ.*), Baldrian (*Danish*), Kozlki (*Pol.*).

This species of valerian is an indigenous, perennial plant, flowering in June. There are two varieties of it; one growing in woods and marshy ground, the other on high pastures and heaths; and the sensible qualities of the second are considerably greater than those of the first. It has been often regarded as the φου of Dioscorides: but Sibthorp has proved this opinion

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[1] A vile, stimulant nostrum, consisting, according to Dr. Paris (*Pharmacologia*), of equal parts of *Balsam of Tolu*, and the *compound tincture of benzoin*, with double the quantity of *rectified spirits of wine*, is sold under the name of *Essence of Coltsfoot*, as a remedy for coughs.

[2] *Mat. Med.* ii. 160.

to be erroneous, and has described the real valerian of the ancients as a distinct species, under the name of Valeriana *Dioscoridis.*[1] The roots of valerian are long and slender fibres issuing from heads: the stems rise three or four feet in height; are round, grooving, hollow, and terminated with flowering branches disposed crosswise. The leaves are larger at the base of the stem, decreasing in size towards the summit; opposite, connate, and bearded at the base below; pinnate, with a terminal leaflet a little larger than the rest; all the leaflets deeply veined and serrated, of a dark-green colour on the upper surface, and paler underneath. The flowers are small, in corymbs, odorous, and interspersed with lanceolate, connate, bearded, waved, pale bractes; the calyx is a slight margin at the top of the germen: the corolla tubular, white with a shade of pink, divided at the margin into five reflected, obtuse segments: the filaments are spreading with the corolla, and support round, yellowish, anthers: the style is shorter, with a trifid stigma; and the capsule is crowned with a feathery pappus, purplish at the base, and contains one oblong, ovate, compressed seed.

The roots should be dug up in autumn when the leaves decay, or in spring before they expand; and be preserved in a dry place. Those which grow wild on a calcareous soil are preferable to those that are cultivated. They lose three fourths of their weight by drying. Cats are allured and delighted with the odour.[2]

Qualities.—Valerian root has a strong, peculiar, unpleasant odour, and a warm, bitter, subacrid taste. Trommsdorff has chemically examined it. Its virtues appear to depend on a very liquid greenish-white-coloured volatile oil, which from its odour and taste seems to contain much camphor. Twenty-two pounds of the dried root should yield eighteen and a half drachms of oil.[3] Its specific gravity at 77° Fahr. is 0·9340; when exposed to light it becomes yellow; a small portion of nitric acid converts it into resin, and a larger dose into oxalic acid. The expressed juice of the root contains

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1 *Sibthorp, Flora Græca,* p. 24. t. 33. Dr. Smith, the learned editor of Sibthorp's work, says, "Hæc est vere φου Dioscoridis, a nemine botanicorum recentiorum ante Sibthorp detecta." Willdenow's 7th species, V. *phu,* which was supposed to be the plant of Dioscorides, does not accord with his description, whereas that of Sibthorp corresponds with it in every particular.

2 Mr. Lambert has endeavoured to prove, that the Valeriana *iatamansi,* a Nepalese alpine plant, is identical with the spikenard of the ancients. This root is fusiform, about the thickness of the human finger, and bearing on the upper part articulations covered with dense fibres, which give them somewhat of the appearance of the tails of animals. Vide *Illustrations of the Genus Cinchona,* &c., 4to. Lond. 1821. 177.

3 *Central. Blatt.* June, 1836.

starch, extractive, and gum; while the roots deprived of this juice yield a portion of black-coloured resin, but consist chiefly of woody fibre.[1] The active matter of valerian root is extracted by boiling water, alcohol, and solutions of the pure alkalies.

Medical properties and uses.— Valerian root is antispasmodic, tonic, and emmenagogue. It is advantageously employed in hysteria, symptomatic epilepsy, hemicrania, and other affections depending on a morbid susceptibility of the nervous system. We have also found it exceedingly serviceable in hypochondriasis; and it is regarded as a useful adjunct to cinchona in intermittents. It may be exhibited in substance combined with a small portion of *mace* or *cinnamon;* or in the forms of infusion or tincture. The extract is a bad form of preparation. The dose of the powdered root may be from gr. x. to ʒ j., given three or four times a day.

Officinal preparations. — *Extractum Valerianæ,* D. *Infusum Valerianæ,* D. *Tinctura Valerianæ,* L. D. *Tinctura Valerianæ composita,* L. E. D.

VERATRUM. *Spec. Plant. Willd.* iv. 895.

Cl. 23. *Ord.* 1. Polygamia Monœcia. *Nat. ord.* Melanthaceæ.

G. 1859. *Hermaphrodite.* *Calyx* none. *Corolla* six-petalled. *Stamens* six. *Pistils* three. *Capsules* three, many-sided.

——— *Male* the same. Rudiment of a pistil.

Species 1. V. *album.*[2] White Hellebore. *Med. Bot. 3d edit.* 753. *t.* 257.

Officinal. VERATRUM, *Lond.* VERATRI ALBI RADIX, *Edin. Dub.* White Hellebore root.

Syn. Hellébore blanc (*F.*), Wiesse Niesswurzel (*G.*), Zwartbloemige nieswortel (*Dutch*), Hevit Prustrot (*Swed.*), Elliboro blanco (*I.*), Veratro blanco (*S.*), Helliboro (*Port.*), Tschemeriza (*Russ.*).

Veratrum is a native of the mountainous parts of Greece, Italy, Switzerland, and Russia. Those specimens which are cultivated in our gardens flower in July. The root is perennial, fleshy, and fusiform, beset with strong fibres, gathered into a head; the stem is thick, round, hairy, erect, three or four feet in height, and branching. The leaves are oblong-ovate, about ten inches long, and five broad in the middle; plaited longitudinally, embracing the stem at the base, and of a yellowish-green colour. The flowers are in long, terminal spikes, composed of small alternate spikelets, each accompanied with a lanceolate bracte; the flower consists of six persistent petals, of a pale-green colour; three of them oblong and lanceolate, with a membranous edge; and three calycynal, which enclose the other three in the bud, one half

[1] *Annales de Chimie,* lxx. 95. *Thomson's Chymistry,* 5th edit. iv. 225.
[2] Ἐλλέβορος λευκος Dioscoridis.

shorter and heart-shaped, with a small point at the top: the filaments closely surround the germen, diverge and bend down at the summit, and are terminated by yellow, quadrangular anthers: the germens are three in each hermaphrodite flower[1], oblong, with erect, bifid, hairy styles, crowned with flat, spreading stigmas: the capsules contain many compressed, membranous seeds.

Although the root only is officinal, yet every part of the plant is extremely acrid and poisonous.

Qualities.—The recent root has a strong, disagreeable odour, and a bitterish, very acrid, permanent taste; but the odour is lost by drying. The dry root, as found in the shops, is sliced, the thick part transversely, and the fibrous longitudinally. The pieces have a dry, corrugated, yellowish-grey appearance, and break with a short, starchy fracture. They are inodorous, and have a slightly bitter taste. When very light and spongy, they must be rejected. The experiments of MM. Pelletier and Caventou have proved that white hellebore owes its medicinal properties to *veratria*, the same alkaline principle which has already been described as the active ingredient in colchicum. The following are the components of white hellebore, according to their analysis:—A fatty matter composed of *elaine, stearine*, and *ammonia, acidulous gallate of veratria*, a *yellow, colouring matter, starch, gum*, and *lignin.*[2]

Medical properties and uses.—White hellebore is a violent cathartic, emetic, and sternutatory. When taken internally, even in moderate doses, its operation is violent and dangerous; producing, besides hypercatharsis, with bloody stools and excessive vomiting, great anxiety, tremors, vertigo, syncope, sinking of the pulse, cold sweats, and convulsions, terminating, if the dose be large, in death. Its external application to an ulcerated surface also produces griping and purging. Notwithstanding these effects, veratrum has been exhibited internally, and with advantage, in mania, epilepsy, scabies, lepra, and obstinate herpetic eruptions.[3] But the most ordinary use of white hellebore is as a local stimulant; either as an adjunct to errhine powders in lethargic cases and gutta serena, or in the form of decoction as a wash, or mixed with lard as an ointment, in scabies and herpetic eruptions. In every form, however, it requires to be used with caution; and even as an errhine, its acrimony should always be obtunded by mixing it with some mild powder, as that of liquorice root or of starch. The dose of the powdered root should not exceed

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[1] The hermaphrodite flowers are generally on the upper, erect spike.

[2] *Journ. de Pharm.* Août, 1820.

[3] *Medical Communications*, i. 297.

grs. ij.; and for errhine purposes grs. ij. or iij. should be diluted with grs. xij. of liquorice powder, and a pinch of it snuffed up the nose for several successive evenings. When taken internally as a poison, the best antidote is a strong infusion of nut-galls.

Officinal preparations. — *Decoctum Veratri*, L. *Tinctura Veratri albi*, E. *Unguentum Veratri*, L. *Unguentum Sulphuris compositum*, L.

VERONICA. *Spec. Plant. Willd.* i. 54.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. ord.* Veroniceæ.
G. 44. *Corolla* border four-cleft, with the lowest segment narrower. *Capsule* two-celled.
* * *with corymbose racemes.*
Species 30. V. *Beccabunga.*[1] Broad-leaved Brooklime. *Med. Bot. 3d edit.* 363. *t.* 132. *Eng. Bot.* x. 655. *Smith, Flora Brit.* i. 20.
Officinal. BECCABUNGA; HERBA, *Dub.* The herbaceous part of Brooklime.

Syn. Beccabunga; Véronique aquatique (*F.*), Bachbunge (*G.*), Beckeboom (*Dutch*), Bekkebunge (*Dan.*), Backabunga (*Swed.*), Potoeznik (*Polish*), Anagalide acquatica (*I.*), Beccabunga (*S.*, *Port.*), Ibunka (*Russ.*).

Beccabunga is an indigenous, perennial plant, common in rivulets and clear ditches, flowering in July and August. The stem, which is procumbent or floating, and gives off from the joints long, simple, fibrous roots, is round, leafy, and, like every other part of the plant, smooth and shining. The leaves are opposite in pairs, on short petioles, oval, serrated, somewhat fleshy, punctured, and of a pale green colour. The flowers are collected in opposite axillary clusters, and individually supported on delicate foot-stalks, accompanied by linear-lanceolate bractes: the calyx is divided into four acute segments, shorter than the corolla, which is of a very beautiful sky-blue colour, with the tube white: the anthers are whitish, supported on filaments longer than the style; and the capsule cloven, almost twin. This plant is green throughout the year, but in greatest perfection in the spring.

Qualities.—It is inodorous, and has, when much chewed, a bitterish, slightly astringent taste. The expressed juice reddens the more delicate vegetable blues in a small degree.

Medical properties and uses. — Although brooklime was formerly considered as a good antiscorbutic, yet it is properly disregarded by modern practitioners; and, as Lewis observes, if it be expected to produce any good effect, it should be used as food.

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1 The specific appellation is probably derived from the Flemish *beck-pungen*, mouth-smart. In Scotland, where it is often eaten like water-cresses, it is called *water-purpie*.

VIOLA. *Spec. Plant. Willd.* i. 1159.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Violaceæ.

G. 446. *Calyx* five-leaved. *Corolla* five-petalled, irregular, horned at the back. *Anthers* cohering. *Capsule* superior, three-valved, one-celled.

* *stemless.*

Species 12. V. *odorata.*[1] Sweet Violet. *Med. Bot. 3d edit.* 251. *t.* 89. *Smith, Flora Brit.* 245.

Officinal. VIOLÆ FLORES, *Dub.* VIOLÆ ODORATÆ FLORES, *Edin.* The recent flower of the violet.

Syn. Violette odorante (*F.*), Blaue veilchen (*G.*), Tamme Viool (*Dutch*), Marts fioler (*Dan.*), Akta fioler (*Swed.*), Viola Mammola (*I.*), Violeta (*S.*), Violetta (*Port.*), Pachutschaja fialko (*Russ.*), Kiet tuong hoa (*Chinese*).

This species of the violet is indigenous, growing in shady places, and flowering in April and May. It is a low creeping plant, giving out runners, which root at small intervals, and send up tufts of leaves and flowers. The roots are fibrous: the leaves heart-shaped, with crenated edges, on slender foot-stalks; the upper surface of a lively green colour, the under paler and downy. The flowers are supported on delicate, quadrangular, channelled flower-stalks, about two inches long, furnished with two small bractes, and curved at the summit: the calyx consists of five green leaflets, the two posterior of which are separated by the spur of the corolla; the petals have a deep violet colour, are white at the base, and irregular; the two lateral ones are bearded near the base, and the posterior, which is slightly keeled, has a large spur, enclosing glandular appendices of the corresponding anthers: the anthers are nearly sessile, whitish, flat, supporting orange-coloured, membranous expansions that cover the upper part of the germen; which is pyramidal, downy, and crowned with a falcated pistil.

For medicinal and chemical purposes, the sweet violet is cultivated in great abundance at Stratford-on-Avon; but the London herb-shops are supplied chiefly from Kent. As the petals only, separated from the calyx, are brought to market, it is difficult to detect the admixture of the viola *hirta*, an inodorous species, which is often practised. It is not, however, a matter of much importance.

Qualities. — Violets have an agreeable sweet odour, and a very slightly bitter taste. When chewed they tinge the saliva blue, and yield their colour and flavour to boiling water. The root, stem, leaves, flowers, and seeds yield an alkaline principle not unlike *emetina*, which M. Boullay, its discoverer, has termed *violina*. It is, like *emetina*, a powerful poison.[2]

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[1] Ιον πορφυρουν Dioscoridis.

[2] *Journ. de Pharmacie*, Jan. 1824.

It is united with malic acid in the violet, as emetine is with gallic in ipecacuanha.

Medical properties and uses. — The petals of the violet are gently laxative, and were formerly regarded as anodyne and pectoral; but they are now scarcely ever used, except for preparing the syrup, which is given occasionally as a purgative to infants. Their aqueous tincture, and the syrup, are useful and delicate tests of the presence of uncombined acids and alkalies: the former changing the blue colour to a red, the latter to a green. The infusion is not liable to change, if it be kept in a tin flask, well stopped. MM. Corte and Willemet, who employed the powdered roots to produce vomiting, found that that was fully effected by doses of two scruples.

Officinal preparation. — *Syrupus Violæ,* E. D.

VITIS. *Spec. Plant. Willd.* i. 1180.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Vitacece.

G. 453. *Petals* cohering at the apex, shrivelling. *Berry* five-seeded; superior.

Species 1. V. *vinifera.*[1] Common Vine. *Med. Bot. 3d edit.* 144. *t.* 57. *Duhamel, Arb.* ii. *t.* 1—6.

Officinal. UVA, *Lond.* VITIS VINIFERA FRUCTUS, *Edin.* VITIS VINIFERÆ FRUCTUS SICCATUS, *Dub.* Raisins, Sun Raisins.

Syn. Raisins secs (*F.*), Rosinen (*G.*), Groote razynen (*Dutch*), Russin (*Swe.*), Uva passa (*I.*), Passas (*S.*), Uvas Passadas (*Port.*), Zabib (*Arab.*), Kishmish (*H.*), Dividatsipalavuttil (*Tam.*), Velit chamoodika gheddie (*Cyng.*), Mewuz (*Pers.*), Zebub (*Malay*).

The vine is a native of Armenia, Georgia, and the Levant; but is now found in most of the temperate regions of the earth, and is cultivated with care wherever its fruit can be brought to perfection. In France, the northern limit of the vine is stated to be 50° 20′[2]; in Thuringia, Saxony, and Siberia, it is 51°; but towards the east it is lower, for although Hungary has much wine, yet Gallicia has none; and in the southern parts of the Russian empire it ascends no higher than 48°. In America, the vine is cultivated in the southern States only, extending no farther north than 38°. The limits southward in the northern hemisphere is properly 15°; but in the high mountainous island of St. Thomas on the coast of Guinea,

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[1] Αμπελος Græcorum.

[2] "In 1827, the quantity of vineyard land in France was 4,265,000 acres, or one thirtieth part of the surface of that kingdom; the annual production of wine is 812,808,040 gallons; the vine-growers are about 1,800,000 in number; and the tax on the wine amounts to 2,900,000*l.* per annum. The wine is thus disposed of: — 198,000,000 of gallons are consumed by the proprietors; 141,680,000 are made into brandy; 91,344,000 lost and wasted among the growers, and 44,000,000 in the hands of the dealers; 24,530,000 exported; and 11,000,000 made into vinegar. The loss by evaporation is 12 per cent. on the small, and 5 per cent. on the large, casks." — *Bowring's Report on the Commercial Intercourse between France and Great Britain.*

in Abyssinia, and in the Deccan, it is found almost under the equator. In the southern hemisphere, its southern limits are 37°. The greatest altitude, in 45° latitude, is 2460 feet; in the north of Switzerland, 1700 feet; on the Alpine range, 2000 feet; in Madeira, 2030 feet; in Teneriffe, 2500 feet; and on the Apennines and in Sicily, 3000 feet.[1] Its culture is supposed to have been introduced from the East, where it was cultivated, and wine made from the fruit, in the earliest ages[2]; and afterwards to have extended to Italy, about 600 years after the foundation of Rome, and thence to Burgundy in the time of the Antonines. It was introduced into Madeira, from the island of Cyprus, in the fifteenth century. In Great Britain, the vine was cultivated before the year 731, when Bede finished his history; but although it was at one period brought to considerable perfection[3], yet, from the greater value of the ground for the cultivation of corn, and the wines produced in this country having never equalled those of the Continent, vineyards are now scarcely known in Britain. The vine, therefore, is cultivated for the dessert only, no raisins are made, and scarcely any wine.

The vine has a slender, twisted, climbing stem, covered with a rough, peeling, fibrous bark. The leaves are lobed, and sinuated, serrated, and placed alternately on long footstalks. The flowers, which appear in June and July, are small, and produced in clusters attended by tendrils: the calyx is very minute: the petals are of a greenish white colour, adherent at their apices, and soon fall off, like a little cap, from the anthers, when they spread and shed their pollen. The fruit is a succulent, globular berry, one-celled when ripe; naturally containing five seeds; but in general only two, which are hard and of an irregular form. There are many varieties of the vine; that which is called the Alexandrian Frontignac yields the most delicious grapes for eating, and the Syrian the largest bunches.[4]

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1 See extract from Prof. Schowe's work on the Geography of Plants. *Edin. Phil. Journ.*

2 We are told, that Noah, after coming out of the ark, planted a vineyard, and "drank of the wine, and was drunken."—*Genesis*, chap. ix. ver. 20, 21.

3 There were many vineyards in different parts of this country from which wine was made; and we are informed, that in the cellar at Arundel castle, in 1763, there were sixty pipes of excellent Burgundy, the produce of a vineyard attached to the castle.—*Museum Rusticum*, i. 85.

4 This is supposed to be the sort of grape which the spies, sent by Moses to examine Canaan, cut down at the brook Eshcol; "a branch with one cluster of grapes, and they bare it between two upon a staff."—*Numbers*, chap. xiii. 23. Strabo relates, that in Margiana bunches of grapes were produced two cubits, or a yard long; and in some of the Archipelago islands, they weigh from thirty to forty pounds. The Syrian grape, in this country, has produced bunches weighing nineteen pounds and a half.—*Martyn's edition of Miller's Dictionary.* There is a grape, cultivated in Madeira as a dessert fruit, the clusters of which sometimes weigh twenty pounds.

Raisins are made from the varieties named the *black-raisin grape*, and the *white-raisin grape*. They are cured in two methods; either by cutting the stalk of the bunches half through, when the grapes are nearly ripe, and leaving them suspended on the vine till their watery part be evaporated, and the sun dries and candies them; or by gathering the grapes when they are fully ripe, and dipping them in a ley made of the ashes of the burnt tendrils; after which they are exposed to the sun to dry. Those cured in the first method are most esteemed. They are brought to this country packed in boxes with sand.

Qualities. — *Grapes*, when recent and fully ripe, have an agreeable, cooling, sweet, subacid taste. They contain, besides water, sugar, mucilage, and jelly, albumen, gluten[1], tannin, bitartrate of potassa, tartrate of lime, phosphate of magnesia, chloride of sodium, sulphate of potassa, and tartaric, citric, and malic acids: and a mucoso-saccharine principle, which Chaptal and Proust regard as the constituent on which the fermentative process in bruised grapes depends. *Raisins* differ from grapes chiefly in the quantity of saccharine matter being more abundant; but the sugar of grapes differs from common sugar in containing less carbon.

Medical properties and uses. — The ripe fruit of the vine is cooling and antiseptic; and when eaten in large quantities, diuretic and laxative. Grapes are very useful in febrile diseases, particularly in bilious and putrid fevers, dysentery, and all inflammatory affections. In Syria, the juice of ripe grapes, inspissated, is used in great quantity in these diseases.[2] Grapes have been strongly recommended as an article of common diet in phthisis[3]; and they certainly contain much bland nutritious matter, well fitted for phthisical habits. *Raisins* are more laxative than the fresh fruit, and are apt to prove flatulent when eaten in any considerable quantity. They are used as an adjunct to some officinal preparations; but add nothing to their efficacy.

VINUM. Wine.

Officinal. VINUM. *Vinum album Hispanicum*, Lond. Dub. VINUM ALBUM HISPANUM, *Edin.* Sherry Wine.

Syn. Vin d'Espagne (*F.*), Wein (*G.*), Wyn (*Dutch*), Win (*Swed.*), Vino (*I.*), Vino de Xerez (*S.*), Khmur (*Arab.*), Bāde (*Pers.*), Dakh ramudh (*H.*).

Although the London and Edinburgh Colleges have designated *sherry* only, yet all the generous wines are occasionally

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1 The gluten excites the vinous fermentation in the juice of the grape when expressed. Fabroni has shown, that it is lodged on the membranes that separate the cells of the grape; and becomes mixed with the saccharine part when the juice is expressed.

2 *Russell's Natural History of Aleppo*, i. 83.

3 *Moore's View of Society, &c. in Italy*, ii. letter 62.

used as medicinal agents, and, therefore, we shall take a general view of the manufacture, characters, and properties of wine.

In the wine countries, when grapes are fully ripe, they are gathered, and immediately subjected to the press, by which the juice is separated from the skins and seeds. In some places the grapes are previously picked from the stalks, the sound being separated from all the unsound with great care[1]: in some they are pressed just as they are gathered from the vines; and in other places they are almost converted into raisins before they are pressed.[2] The expressed juice is called *must*, and contains all the principles which we enumerated above as being present in the grape; these, when the vats holding the *must* are placed in a temperature of 70°, begin to act upon one another, the liquor becomes turbid, an intestine motion is evident in it, its temperature increases, a scum collects on its surface, and carbonic acid gas is disengaged. This is the process of vinous fermentation. In a few days its activity gradually decreases, the scum and impurities subside to the bottom; and the liquor clears, having lost its saccharine taste, and becomes *wine*. It is then put into barrels, and in due time into bottles, in both of which kind of vessels the fermentation is continued, although in an imperceptible degree; nor is it altogether completed till the wine attains the utmost limits of its age, and passes into the acetous fermentation. All the principles of the *must* are perhaps required for the production of wine; but the saccharine matter, the gluten, and the vegetable acid, are essential; and on the proper quantity of the first in particular, and the manner in which the fermentation is conducted, depend the strength and goodness of the wine. When the sugar is in too great quantity, and not completely decomposed, or the fermentation is checked, the wine retains a sweet taste; a more proper proportion and perfect decomposition, with a brisker fermentation, render it strong and spirituous; but if the quantity of sugar be small, and at the same time there is a deficiency of tartar in the *must*, a thin and weak wine is produced. When it is bottled early it becomes brisk and sparkling; and it is rough and astringent when the fermentation has been conducted on the skins, particularly on those of the coloured grapes; which also gives colour to the wine; for when the juice only is fermented, white wines are produced from coloured grapes.

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[1] This is the case at Madeira; and also at Epernay, where the best champagne is made. In Madeira, every kind of grape which the island produces, except the malmsey and the sercial, are pressed together for making the wine which bears the name of the island.

[2] The wine of Chio, which was esteemed by the ancients for its strength, sweetness, and exquisite aromatic flavour, is made from nearly dried grapes.

Wine that has been too long fermented before being put into the casks, is very apt to become sour; and frequently oxides of lead, as litharge and white lead are employed to correct the acidity. According to Fourcroy, these form a soluble triple salt, an aceto-tartrate of lead, by uniting with the acetic and tartaric acids in the wine[1]; which, daily experience shows, produces violent colic, and other deleterious effects on those who drink it. The fraud may be detected by means of a solution of sulphuretted hydrogen gas, as has been already explained (see *Plumbum*), or by the prussiate of potassa, a few drops of which will produce a whitish precipitate if lead be present. Port wine is often adulterated, and coloured with dye-stuffs. Liquid potassa detects the artificial admixtures of wines. It precipitates the natural principles of wine, green; berries of yebb, precipitate them violet; Indian wood, violet; red mulberries, violet; Brazil wood, red; beet, red; litmus, clear violet; myrtle-berries, wine-lees colour; elder-berries, bluish. But besides those articles already mentioned, both arsenic and corrosive sublimate have been used for fining wines. Nitrous ether is sometimes employed to perfume wines.

Qualities.—Various circumstances, such as climate, soil, and the mode of conducting the fermentation, modify the flavour and taste of wine. The odour and flavour in the more fully fermented wines, seems to depend on the vinous process, as it bears little resemblance to the natural flavour of the fruit; from which, however, in the sweet and half-fermented wines, it is immediately derived; but flavouring ingredients, as bitter almonds and orris root, are also used in the manufacturing of wines. Malaga, Frontignac, Tokay, Vino tinto, Montefiuscone, Schiras, and the Malmsey wines of the Greek islands, are sweet to the taste, and consequently the result of imperfect fermentation; Champagne, Goosebury, and all sparkling wines, owe their briskness to carbonic acid gas: Hock, Rhenish, Mayne, Barsac, Burgundy, Claret[2], and Hermitage contain a certain quantity of uncombined acid, and are termed light and dry; while Marsala, Madeira, Sherry[3], and Port, are dry and strong. The odour of *sherry* is pleasant and aromatic; the taste warm, with some degree of the

[1] *Annales de Chimie*, vol. i. p. 76.

[2] The best claret is made from grapes grown at Château Margaux. The following quotation proves that it was known in England in the 13th century. Vinum, tam album quam rubrum, *claritum*, medinum, &c. were claimed by the monks of Winchester, on festivals in 1285. — *Regist. Priunt. S. Smith, Winton MS. quoted in Warton's Hist. of Poetry*, 4to. vol. i. p. 425.

[3] The sherry, or sherris-sack of Shakspeare's time, may mean, as Dr. Henderson supposes, the *dry* or *sec* wine of Xeres; or, if it was the first wine exported from Spain, the term sack, in my opinion, may have been given to it from that circumstance, *vino sacco*, in Spanish, signifying export wine.

agreeable bitterness of the peach kernel; the taste of *port* is austere and bitterish: *claret* is less rough, thinner, slightly acidulous, and higher flavoured; and *hock* acidulous. Of the common white wines, *marsala* is undoubtedly the strongest. But notwithstanding these and other differences, the essential components of all wines are the following:—One or more *acids*, generally the malic, but in some the carbonic predominates, and all of them contain some tartaric; *extractive matter*, which in old wines is deposited with the tartar; a *volatile oil* on which the flavour depends; *colouring matter;* and *alcohol*, the most important of the ingredients, and that one on which their dietetic and medical properties depend. Gay Lussac has proved that this principle is ready formed in wine, and not, as Fabroni supposed, the result of its distillation. The following table is intended to show the average quantity, by measure of alcohol, oily, unctuous, resinous, and gummy matter contained in several wines, which were examined by Neumann.

A Quart of	*contains of*											
	highly rectified Spirit.		*thick, oily, unctuous, resinous Matter.*			*gummy & tartareous Matter.*			*Water.*			
	℥.	ʒ.	℥.	ʒ.	grs.	℥.	ʒ.	grs.	℔.	℥.	ʒ.	grs.
Aland - -	1	6	3	2	0	1	5	0	2	5	3	0
Alicant - -	3	6	6	0	20	0	1	40	2	2	6	0
Burgundy -	2	2	0	4	0	0	1	40	2	9	0	20
Carcassone -	2	6	0	4	10	0	1	20	2	8	4	30
Champagne	2	5	0	6	40	0	1	0	2	8	3	0
French - -	3	0	0	6	40	0	1	0	2	8	0	20
Frontignac -	3	0	3	4	0	0	5	20	2	4	6	30
Vin de Grave	2	0	0	6	0	0	2	0	2	9	0	0
Hermitage -	2	7	1	2	0	0	1	40	2	7	5	20
Madeira - -	2	3	3	2	0	2	0	0	2	4	3	0
Malmsey -	4	0	4	3	0	2	3	0	2	1	2	0
Vino de Monte Pulciano	2	6	0	3	0	0	2	40	2	8	0	20
Moselle - -	2	2	0	4	20	0	1	30	2	9	0	10
Muscadine -	3	0	2	4	0	1	0	0	2	5	4	0
Neufchatel -	3	2	4	0	0	1	7	0	2	2	7	0
Palmsec - -	2	3	2	4	0	4	4	0	2	2	5	0
Pontac - -	2	0	0	5	20	0	2	0	2	9	0	40
Old Rhenish	2	0	1	0	0	0	2	20	2	8	5	40
Rhenish - -	2	2	0	3	20	0	1	34	2	9	1	6
Salamanca -	3	0	3	4	0	2	0	0	2	3	4	0

A Quart of	*contains of* *highly rectified Spirit.*		*thick, oily, unctuous, resinous Matter.*			*gummy & tartareous Matter.*			*Water.*			
Sherry - -	3	0	6	0	0	2	2	0	2	0	6	0
Spanish - -	1	2	2	4	0	9	4	0	1	10	6	0
Vino Tinto -	3	0	6	4	0	1	6	0	2	0	6	0
Tokay - -	2	2	4	3	0	5	0	0	2	0	3	0
Tyrol, red -	1	4	1	2	0	0	4	0	2	8	6	0
Red Wine -	1	6	0	4	40	0	2	20	2	9	3	20
White - -	2	0	0	7	0	0	3	0	2	7	0	0

Mr. Brande, Dr. Prout, and M. Zez, have prosecuted this inquiry with more accuracy. In the following table the quantity of alcohol of specific gravity ·850, in 100 parts of wine, is given on the authority of the experiments of these distinguished chymists.

TABLE of the PRINCIPAL KNOWN WINES, and of the QUANTITY of ALCOHOL IN WINES.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
Portugal..	*Red.* Port.......	...............(average)	22·96 B.[1]	
		Vinho de Ramo......	15·62 P.	Deep purple; rough; bitter sweet; spirituous.
		Collares...............	19·75 P.	
	White. Bucellas	....	18·49 B.	
	Setuval.....	....	—	Pale straw; flavour delicate.
	Carcavellos	....	18·65 B.	Amber colour; sweet.
Spain.......	*White.* Sherry	....	19·17 B.	Deep amber colour; nutty and aromatic.
		Amontillado		
		Paxarete	—	Amber colour; sweet and aromatic.
	Malaga.....	............(A.D. 166)	18·94 B.	
		Pedro Ximenes......	—	Amber colour; flavour delicate, rich, sweet.
		Lagrima de Malaga	—	Colour deeper; sweet, luscious.
	Malmsey of Sitges Priory	....	—	Resembles Malaga.
	Red. Tent, *Tintilla*	....	13·30 B.	Purple; sweet; flavour strong, spicy.
	La Torre... Peralez...... Segorve .... Vinaroz ..... Benicarlo... Carinena ...	....	—	Sweet.

[1] B means on the authority of Mr. Brande; P of Dr. Prout; and Z. of M. Zez.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
Spain...... Majorca...	*Red.* Val de Penas Manzanares Ciudad Real	....	—	Resembles claret.
France.....	*White.* Alba flor	....	17.26 B.	Resembles Sauterne.
	Champagne	Sillery............	13·30 B.	Still, of an amber colour.
		Ay, Hautvilliers, Epernay, Dizy, Avenay, Avise, Oger, Pierry, Closet, Lemesnil, Cramont, Menil	—	Brisk or sparkling; delicate flavour and aroma; slightly acidulous; but some are still, or, at most, simply creaming; generally paler than Sillery.
	Red. Champagne	Verzy..................	11·93 B.	
		Verzynay Mailly, Bouzy, St. Basle, Chamery, Ecueil Villedemange	—	Good colour and body, and a high, agreeable flavour.
		Clos St. Thierry.....	—	Colour and aroma of Burgundy, with lightness of Champagne.
	White. Arbois... Papillon. Chablis..	....	—	Inferior to Champagne, but resembling it in some of their qualities.
	Red. Burgundy	....	14·57 B.	
		Romanée Conti, Clos-Vougeot, Chambertin, Richebourg, Romanée de Saint Vivant, Tache, St. George............	—	Beautiful, rich, purple colour; exquisite flavour, with a full body, yet delicate and light.
		Volnay, Pomand, Corton, Vosne, Nuits, Beaune Chamboll, Morey, Meurseault, Savigny-sous-Beaune	—	Excellent wines, but inferior to the former.
		Romaneche, Torins, Chenas, Tonnere, Auxerre	—	Strong generous wines.
	White. Burgundy	Mont Rachet	—	High perfume and nutty flavour.
		La Perrière, la Combotte, la Goutted'or, la Genévrière, les Charmes, Vaumorillon, les Grisées, Valmur, Grenouilles, Vaudesir, Bougnereau, Mont de Milieu, Fuissey, Pouilly	—	Rich, high-flavoured wines.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
France	*Red.* Hermitage	.... Meal, Greffieux, Basas, Beaume, Raucoule	32·2 B.	Dark purple colour; flavour exquisite, and perfume resembling that of the raspberry.
		Crozes, Gervant, Mereceurel.............	—	Less delicate in flavour.
	White. Hermitage	Vin de paille..........	17·43 B.	Amber colour; sweet, luscious.
	Côte Rotie	.... Verinay	12·32 B.	Resemble Hermitage in flavour, but are weaker.
	Seyssuel...	....	—	Violet perfume.
	Clarette of Die.......	....	—	Light, sparkling, delicate.
	Red. Tavel...... Chuzlan..... Beaucaire...	....	—	Bright rose colour; flavour and aroma delicate.
	St. Geniez... Lirac .... St. Laurence St. Joseph .. St. Georges	....	—	Inferior.
	Cornas	....	—	Full rich colour; flavour of Ratafia.
	White. Vin de Cotillon........	St. Peray, St. Jean	—	Sprightly; colour of the violet.
	Frontignac	....	12·79 B.	Luscious; flavour of the grape.
	Lunel	Clos-Mazet	15·52 B.	Bright yellow colour; less luscious than Frontignac.
	Beziers....	Cazoul, Bassan	—	Resembles Sherry.
	Red. Rousillon	.... (average) Bagnols sur Mer, Cosperon, Collioure, Toremila, Grenache, Terrato..............	18·13 B.	Great body and colour; becomes tawny when old.
	White. Rousillon	Rivesaltes	—	Bright golden colour; fragrant aroma; flavour of the quince.
		Salces (*Maccabac*).....	—	Similar, inferior to Rivesaltes.
		....	21·24 P.	Red; somewhat rough; sweet.
	Red. Claret.....	.... (average)	15·10 B.	
		Lafitte, Latour, Leoville, Château Margaux, Rauzan	—	Deep purple; delicate flavour; violet perfume.
		(*Graves*) Haut Brion, Haut Talanu, Merignac, (average) *Artimino*[1], *Kissanos*[2]	13·37 B.	Resemble the better sorts of Burgundy, but are rougher.

[1] A Tuscan wine.

[2] A Canadian wine.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
France.....	*Red.* Claret.....	Gorce, Larose, Branmouton, Pichow, Longueville	—	Light wines; of good flavour.
		St. Emilion, Canon...	—	Harsh; odour of burning sealing-wax.
	White. Claret.....	Preignac, Beaumes, Langon, Cerons, Buzet...............	—	Secondary quality.
		St. Nessans, Sancé, Mont Basillac	—	Sweet.
	Barsac	....	13·86 B.	Amber colour; full; aroma somewhat like cloves.
	Sauterne..	....	14·22 B.	Amber colour; sweetish.
Germany..	*White.* Rhenish ..	Johannisberger (1788)	8·7 P.	High flavour and perfume.
		Steinberg	—	Strongest of the Rhine wines; sweetish.
		Rüdesheimer (1811) Grafenberg	10·72	Like the former.
		Markebrune Rothenberg	—	Soft and delicate flavour.
	Red. Rhenish ..	(Hock) Hocheimer, (average)...........	13·68 B.	Light; acidulous.
		Amanshausen, Leibfranenmilch, Scharlachberger..........	—	Considerable body.
		Laubenheim, Nierstein	—	Light; delicate perfume and taste.
		Bodenheimar (1802)	13·96 Z.	Delicate perfume and taste.
	Moselle....	Braunenberg, Pisport, Zeltingen, Wehlen Graach..............	—	Light, pleasant flavour; high aroma.
Hungary..	Tokay............	....	9·88 B.	Brownish yellow when new, greenish when old.
		Tokay Essence	—	Syrupy, thick, muddy.
		Ausbruch..............	—	Thinner and more vinous.
		Maslas	—	Inferior to the two former.
	Ménser	Ædinburg, Rusth, Ofen	—	Sweet, resembles Tokay.
Russia.....	Don Wine........	....	....	A white wine.
Italy.......	Montepulciano	....	22.	Sweet, with high flavour.
		Aleatico	16·20 P.	Brilliant purple; luscious aromatic flavour.
	Verdea	....	—	Greenish colour and high flavour.
	Trebbiano	....	—	Golden colour; sweet.
	Albano...........	Montefiascone	—	Pale straw colour; light.
	Orvietto..........	....	—	Both red and white; light.
	Lacrima Christi	....	19·70 B.	Red, luscious, sweet.
		Monte Somma, Gallite	—	The best Lacrima.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
Italy	Lacrima Christi	Ischia, Nola, Ottajano, Novella, Torre del Greco, Pozzuolo	—	Second-rate wines.
	Vino Greco		—	Sweet.
Sicily	Marzala	(average)	25·9 B.	
		Twenty-one years old, submitted to Soemmerring's process five years	18·40 P.	Resembles Madeira.
	Syracuse		15·28 B.	Both red and white.
	Etna		30·00 P.	Resembles Madeira, with the harsh flavour of Sicilian brandy.
	Lissa		15·90 P.	Resembles Claret.
Ithaca	Red wine of Ithaca		—	Hermitage flavour.
Cephalonia	Cephalonia		—	A dry red wine.
Candia	Rithymo		—	A fine-flavoured white wine.
Cyprus	Vino Santo		—	Palestraw-colour; sweet.
Tenos	Tenos		—	Luscious, sweet.
Tenedos	Red Muscadine		—	Resembles Tokay.
Smyrna	White Muscadine		—	Luscious, sweet.
Madeira	Madeira	(average)	22·27 B.	Full; pungent, nutty, or bitter-sweet, rich, aromatic flavour.
		(West Indies)	21·20 P.	
		Sercial (average)	20·32 B.	
		Malmsey [1]	16·40 B.	Luscious, sweet.
Teneriffe	Teneriffe		19·79 B.	Resembles Madeira.
Cape of Good Hope	Constantia		14·50 P.	Sweet, luscious, pungent.
		Red Constantia	18·92 B.	
		White Constantia	19·75 B.	
	Steen wine		10·60 P.	Resembles Rhenish.
	Cape Muschat		18·25 B.	Sweet.
	—— Madeira	(average)	20·51 B.	Harsh, earthy taste.
Persia	Shiraz	White	19·80 P.	Yellow, or topaz colour; sweetish; resembles Madeira.
		Red	15.52 B.	Resembles Tintilla, with a pitchy taste.
England	Grape wine		18.11 B.	Resembles Rhenish.
	Raisin wine	(average)	25·12 B.	
	Currant wine		20·55 B.	Various.
	Gooseberry wine		11·84 B.	Brisk like Champagne.
	Elder wine		9·87 B.	Thick, narcotic.
	Orange wine		11·26 B.	Sweet, luscious, flavour of the fruit.
	Cyder		9·87 B.	
	Perry		7·26 B.	
	Mead		17·32 B.	Sweet.

[1] This name is derived from *Malvasia*, a town in the Bay of Epidaurus Limera, in the Morea, whence the grape was originally derived, but now producing no good wine.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol in spec. grav. ·825 in 100 parts.	Qualities.
England .	Sycamore wine	*juice fermented with sugar.*		
Barbary ...	Usuph	*water in which raisins are steeped.*		
Nepaul	Sihee	*a grape wine*...........	—	Strong and harsh.
Hindostan	Tari	*fermented juice of the Palmira tree, Borassus flabelliformis, Callu, Teildy, Saura.*		
	Sinday..........	*fermented juice of Elate sylvestris, the wild date.*		
China......	Cha...............	*nearly the same as Tari.*		
	Mandurin	*boiled rice, fermented.*		
Tartary....	Koumis..........	*fermented mare's milk.*		
	Airen.............	*fermented cow's milk.*		
	Kanyangtsyen	*the flesh of the lamb fermented with rice and other vegetables.*		
Africa......	Millaffo........	*fermented juice of the palm-tree, Congo.*		
	Pombie	*fermented millet, Caffres.*		
Brazil.. ...	Kooi	*fermented juice of Apples.*		
Mexico....	Palque.........	*fermented juice of the Agave Americana.*		
Norway ...	Birch wine....	*juice of Betula alba fermented with sugar.*		

Medical properties and uses. — Wine when good, and of a proper age, is cordial and tonic; but when new, it is flatulent, debilitating, and purgative, and intoxicates sooner than old wine. In a dietetical point of view, the temperate use of wine promotes digestion, and gives additional energy to the action of the heart and arteries, strengthens the animal functions, exhilarates the spirits, sharpens the wit, and calls into action all the intellectual powers: but when taken in excess, it intoxicates, producing sickness, headach, vertigo, and diarrhœa, with nervous tremors, which continue for two or three days; and, like ardent spirit, its habitual excessive use extinguishes the faculties of both body and mind, producing dyspepsia, emaciation, and debility, hepatic and pulmonary inflammation, palsy, gout, dropsy, delirium, tremors, and a long train of diseases and wretchedness. We nevertheless hear of very extraordinary quantities of wine being drunk with impunity by some individuals. I knew a man who had not retired sober to bed for twenty years; and yet lived to upwards of eighty years of age.[1] Drunkenness, however, is the vice of barbarians; and, as nations merge from that state, it evidently becomes less prevalent. In Britain it is now happily confined to the dregs of the people.

As a remedy, wine is stimulant, antiseptic, tonic, and antispasmodic. Its stimulating properties are less diffusible, but more permanent, than alcohol; and thence its dose is more easily regulated, and its effects are more certain. In all diseases accompanied with much debility, as typhoid fevers, and in cases of extensive ulceration or gangrene, wine is not only the best addition to cinchona bark and opium, but is a remedy on which alone there is much reliance; in some convulsive affections, as symptomatic tetanus, and chorea, much benefit has been derived from its use: and in the convalescences from all severe diseases it is the most efficacious and the quickest mean we can employ for restoring the exhausted strength and vigour. Wine operates less powerfully on the system in a state of disease than in health; the quantity, however, to be given, and the proper period of exhibiting it, require to be regulated with much judgment. The skin being open, and not dry or hot, the strength sinking, and the ulcerations, if any exist, assuming a gangrenous appearance, indicate the use of wine; and when, in the event of the pulse being low and fluttering, wine restores its firmness without increasing delirium, and induces sleep, it may be given with a confidence of the greatest benefit. But if, on the contrary, it renders the pulse quicker, increases heat, thirst, delirium, or watchfulness, its exhibition ought immediately to be discontinued. The quantity to be given depends entirely on the nature of the disease, and the intentions for which it is administered. In typhus, the proper rule is to give it till the pulse fills, the delirium abates, and the extremities warm; and it should be repeated on the smallest appearance of stupor, quick and sinking pulse, or tremor.[2] A few glasses, and these even diluted with water, given in the space of twenty-four hours, will often produce all that is required from wine; but sometimes very large quantities are necessary. In a case of symptomatic tetanus, mentioned by Currie[3], five bottles of Madeira wine were taken every day for some time, without producing the least symptoms of inebriety, or morbidly exciting the pulse; but, on the contrary, with the utmost ad-

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[1] The Emperor Maximin could quaff six gallons of wine at a sitting; and a Mr. Vanhorn, of modern notoriety, drank, in the course of twenty years, 35,688 bottles, or 50 pipes of red port. In the reign of Henry the Eighth, wine and beer were used at breakfast, and the quantity served to one person was a pint of each.

[2] *Moore's Medical Sketches.*

[3] *Reports on Water*, i. 174.

vantage in allaying irritation, and relieving the patient. In ordinary cases of fevers, however, wine is, perhaps, in general, too freely given, so as to occasion exhaustion instead of supporting strength. In a dietetical point of view, wine is useful or prejudicial, in proportion as the fermentation is more or less perfect. In wines containing the malic acid, when the fermentation has been imperfect, the fermentative state of the liquor is recommenced in the stomach, and much carbonic acid and other gases are evolved, which, distending that organ, oppress the individual; and if he be dyspeptic, produce depression of spirits and all the horrors of hypochondriacism. When wine, however, is good, it stimulates gratefully the nerves of the stomach, and, consequently, promoting a more healthy secretion of the gastric fluid, greatly assists the chymification of the food. *Sweet wines* are more apt to become acescent than the dry wines; but it is erroneously conjectured that the same objection applies to the use of the *Rhenish wines;* for, as these wines contain much free tartaric acid, and scarcely any malic or gallic acids, they are less liable to ferment than many of the stronger wines. Sparkling, brisk wines, such as Champagne, intoxicate more speedily than the stiller wines, but the morbid excitement is of short duration, and the subsequent exhaustion is comparatively trifling. They are said to induce gout in those strongly predisposed to that disease; but, probably, more is to be attributed to the luxurious dishes which generally accompany the use of Champagne, than to that exhilarating beverage. In febrile habits, Burgundy, Port, and the stronger white wines, are to be avoided; but in diseases of debility, particularly where the stomach requires the aid of a tonic, these wines will prove beneficial. In convalescence, however, from acute diseases, if wine be admissible, claret or some of the better kinds of Rhine wines — for example, Moselle or Hock — are preferable; and this is particularly the case, if with a low pulse and much exhaustion the nerves are so excitable as to produce a febrile action in the arterial system, on the application of stimulants, either corporeal or mental. In those who have a disposition to obesity, the Rhine wines, on account of their diuretic properties, are preferable to every other kind for daily use. Where health abounds, wine is altogether unnecessary; but, as habit has rendered the use of it general, it is to be lamented that, in this country, the high prices of the more wholesome kinds force the great majority of the middling ranks to indulge in the use of those which contain too large a quantity of alcohol, and the lower classes to the abuse of spirituous liquors.

When wine is prescribed as a cordial in a state of convalescence from acute diseases, or in a weakened state of the habit, it should not be taken with dinner or any other meal; but at noon, upon an empty stomach.

Officinal preparations. — *Vinum Aloës*, L. D. E. *Vinum Colchici*, L. *Vinum Gentianæ compositum*, E. *Vinum Ipecacuanhæ*, L. D. E. *Vinum Nicotianæ Tabaci*, E. *Vinum Opii*, L. D. E. *Vinum Rhei*, E. *Vinum Antimonii Potassio-tartratis*, L. *Vinum Veratri*, L. E.

ULMUS. *Spec. Plant. Willd.* i. 1324.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Ulmaceæ.

G. 505. *Calyx* five-cleft. *Corolla* none. *Capsule* (*samara*) compressed, membranaceous.

Species 1. U. *campestris*.[1] Common Elm. *Med. Bot. 3d edit.* 710. *t.* 242. *Smith, Flor. Brit.* i. 281.

Officinal. ULMUS, *Lond.* ULMI CAMPESTRIS CORTEX, *Edin.* ULMUS; CORTEX INTERIOR, *Dub.* Elm Bark.

Syn. Orme (*F.*) Ulmrinde (*G.*), Olm (*Dutch*), Alm (*Dan.*), Kara Wiazowa (*Pol.*), Olmo (*I., S., Port.*), Ilim (*Russ.*).

The elm tree is indigenous, and very abundantly cultivated, flowering in March or early in April, before the leaves are unfolded. It grows to a considerable height, sending off strong, spreading, lateral branches; with the bark of the trunk very rough and cracked, but that of the younger branches smooth and tough. The leaves are rough on both sides, villose beneath along the veins, doubly serrate, longer on one side of the midrib than on the other, about three inches long, two broad, and of a dark green colour. The flowers, which appear before the leaves, are in distinct gems, clustered, scarcely peduncled, numerous, small, of a brownish flesh-colour, and have a violet odour: the capsules are oval, oblong, bordered, and containing a single, roundish seed.[2]

The inner part of the bark of the younger branches, which is of a yellowish colour, is the part officinally used, and is sold free from the epidermis.

Qualities. — Elm bark is inodorous, and has a slightly bitter, slimy taste. When boiled in a small quantity of water, it forms a thick dark brown-coloured decoction, which gelatinises as it cools; and when evaporated leaves a brittle, semi-transparent substance, soluble in water, but insoluble in alcohol and ether, to which, however, it imparts a brownish colour. The brittle residue, when treated in the same manner as Klaproth treated the gum-like exudation from the *Ulmus nigra*, afforded nearly the same results[3]; and consequently it must be regarded as

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1 Πτελεα Græcorum.

2 The age of the elm is yet unknown. Several stocks of it which were planted in France, by the orders of Sully, in 1580, still survive (1824). They are from 80 to 90 feet high, and from 25 to 30 in circumference.

3 *Thomson's Chymistry*, 4th edit. iv. p. 695.

ulmin: but from the effects of some re-agents (see *Decoction*), I am inclined to consider it a peculiar modification of mucus, combined with extractive, gallic acid[1]; and bitartrate of potassa, which Scheele detected in elm bark.

Medical properties and uses.—This bark operates as a diuretic. It has been given with seeming benefit in herpetic eruptions; and Dr. Lettsom[2] attributes the cure of a severe case of "lepra ichthyosis," in which other remedies had failed, to the use of this bark. I have long prescribed it instead of sarsaparilla. Other practitioners have also related cases of its efficacy; but Dr. Willan[3] thinks it is of little use. It is generally given in the form of decoction.

Officinal preparation.—*Decoctum Ulmi*, L. D.

UVA. Vide *Vitis.*

UVÆ URSI FOLIA. Vide *Arbutus.*

WINTERA. Vide *Drymis.*

ZINCUM. Zinc.

Syn. Zinc (*F.*), Zink (*G.*), Zinco (*I.*), Spiagter (*Russian*), Tootanāgum (*Tam.*), Sungbusrie (*Duk.*).

Zinc is a semi-ductile metal procured in great abundance in Britain, particularly in Derbyshire; and in most of the mining countries of Europe. It occurs in

A. The metallic state.

i. combined with sulphur and iron. SP. 1. *Blende.*
Var. *a.* Yellow blende.
b. Brown blende.
c. Black blende.

B. Oxidized.

ii. combined with silica. 1. *Red Zinc ore.*
iii. acidified by carbonic acid. 2. *Electric calamine.*
3. *Common calamine.*
Var. *a.* crystallized.
b. compact.
c. earthy.

As the fourth species of these ores is an article of the Materia Medica, we shall describe its characters and properties before we notice those of metallic zinc.

1. COMMON CALAMINE.

Officinal. CALAMINA. *Carbonas Zinci impura*, Lond. CARBONAS ZINCI IMPURUS, *Edin. Dub.* Calamine. Impure Carbonate of Zinc.

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[1] Very little tannin is present, as it scarcely affects a solution of gelatine.
[2] *Medical Memoirs*, p. 152.
[3] *Description, &c. of Cutaneous Diseases*, i. p. 139.

Syn. Pierre Calaminare (*F.*), Galmey (*S.*), Kalmei (*Belg.*), Gallmeja (*Swed.*), Pietra Calaminare (*I.*), Calamina (*S.*), Piedra Calaminar (*Port.*), Madal tootum (*Tam.*).

This ore of zinc is found abundantly in Derbyshire, Somersetshire, Cumberland, and Flintshire, occurring in veins in secondary limestone, generally accompanied by galena, calcareous spar, quartz, and other ores of zinc. In the Harz[1] the three varieties are indiscriminately used; and consist, according to an analysis by Mr. Smithson[2], of the following components: *var. a.* 65·2 oxide of zinc, 34·8 carbonic acid; *var. b.* 64·8 oxide of zinc, 35·2 carbonic acid; *var. c.* 71·4 oxide of zinc, 13·5 carbonic acid, 15·1 water, — in 100 parts of each variety. They are, however, generally calcined in a moderate heat, by which part of their carbonic acid is dissipated, before they are brought to the shops.

Qualities. — Calamine is usually in the form of greyish yellow, or reddish yellow, friable lumps, without lustre, opaque, and breaking with an irregular, earthy fracture. The specific gravity of the first two varieties is 4·334; that of the last 3·584. Before the blowpipe, calamine becomes yellow; and when exposed to its utmost heat, is sublimed. It dissolves in sulphuric acid with effervescence, but does not gelatinise. It is not used as a remedy till after it is prepared; and then only as an external application.

Officinal preparation. — *Calamina preparata*, L. E. D.

2. METALLIC ZINC.

Officinal. ZINCUM, *Lond. Edin. Dub.* Zinc.

Although the method of extracting zinc from its ores had been long known and practised in India and China, yet it was not known in Europe till about 1721, when Henke pointed out a method of extracting it from its ores. Von Swab first obtained it by distillation in 1742. The Greeks certainly were not acquainted with zinc, although they employed cadmia, which contained zinc, in the manufacture of brass. At present it is well understood, and conducted in the following manner: — The sulphuret or blende, which is the ore usually employed, is first broken to pieces, and the galena and pyrites separated by hand; and is then roasted in a reverberatory furnace, by which the carbonic acid and part of the sulphur are driven off. The roasted ore being washed, to separate the metallic particles from the lighter parts, is now ground in a mill with one eighth of its weight of charcoal; and put into large earthen jars placed in a circular furnace, and through

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[1] The annual produce is 115 tons.
[2] *Phil. Trans.* 1803, 17.

the bottom of each of which passes an iron tube, which goes through the floor of the furnace into a vessel of water placed beneath. The cover of each jar is firmly and accurately luted on, so that the reduced zinc, as it is elevated by the strong heat of the furnace, not finding a vent to escape by the top, descends through the iron tube into the water, and is there condensed in small metallic drops, which are afterwards melted and cast into ingots, in which state it is brought to market[1], under the name of *Speltre.*

Qualities.—Zinc, when rubbed between the fingers, emits a very perceptible odour, and has a peculiar taste. Its colour is brilliant, white with a shade of blue, and its fracture shining and lamellated; hard, yet staining the fingers black when rubbed upon them. Its specific gravity varies from 6·861 to 7·1. In any temperature between 212° to 400°, it is very malleable and ductile; but at a higher temperature it can be pulverised in a mortar. It may be drawn into wire, but its ductility is not great. Exposed to a white heat, in close vessels, it distils over unchanged. Its equivalent is 32·3. Zinc melts at 773° [2] of Fahrenheit; if in contact with air, it is rapidly oxidised; and, at the temperature of ignition, 941° Fah., burns with a white dazzling flame, and is volatilised in the state of a flocculent, white oxide. It is oxidised and soluble in all the acids; and decomposes water when aided by a small portion of sulphuric or of hydrochloric acid: the hydrogen set free holds in solution a small quantity of metallic zinc. It is used only for pharmaceutical purposes.

Officinal preparations.—*Zinci Oxydum,* L. E. D. *Zinci Sulphas,* L. E. D.

3. IMPURE OXIDE OF ZINC.

Officinal. OXIDUM ZINCI IMPURUM, *Edin.* Impure Oxide of Zinc.

Syn. Tutie (*F.*), Tutia (*G.*), Tuzia (*I.*), Atutia (*S.*).

This substance is supposed to be an artificial compound of the sublimed oxide of zinc that collects in the chimneys of the furnaces in which the ores of this metal are roasted, mixed with clay and water, and baked.

Qualities.—Tutty is inodorous and insipid, of a brownish colour on the outside, moderately hard and ponderous, and breaks with a smooth fracture. The internal colour is yellowish; and the pieces sometimes contain small globules of zinc. The oxide it contains consists of 85 zinc, 15 oxygen, in 100 parts; or 1 equivalent of zinc = 32·3 + 1 of oxygen

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[1] The principal works are near Bristol, and at Swansea.
[2] Daniell.

= 8, making the equivalent = 40·3. It is not employed as a remedy until it is levigated and prepared.

Officinal preparations.— *Oxidum Zinci impurum preparatum*, E. *Unguentum Oxidi Zinci impuri*, E. D. *Unguentum Zinci*, L.

ZINGIBER. *Trans. Linn. Soc.* viii. 347.

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Scitamineæ.

G. novum. *Anther* double. *Filament* lengthened beyond the anther with a furrowed awl-shaped beak embracing the style. *Style* received in the furrow of the anther.

Sp. 1. Z. *officinale.*[1] Officinal Ginger. *Jacquin, Hortus Vindobonensis*, i. 31. *t.* 75. (Amomum *Zingiber*) *Willd. Spec. Plant.* i. 6. *Med. Bot. 3d edit.* 731. *t.* 250. *Rumph. Amb.* ii. *t.* 12. *Roscoe, Lin. Trans.* viii. 348.

Officinal. ZINGIBER, *Lond.* AMOMI ZINGIBERIS RADIX *Edin.*, AMOMUM ZINGIBER ; RADIX, *Dub.* Ginger root.

Syn. Gingembre (*F.*), Ingwer, Imber (*G.*), Zenzero (*I.*). Gengibre (*S.*), Gengivre (*Port.*), Gember (*Dutch*), Ingefer (*Dan.*), Ingefära (*Swed.*), Jembier (*Pol.*), Sont'h, Ada, Adrac (*H.*), Sunt'hi (*Sans.*), Dshey (*Javanese*), Sookkoo (*Tam.*), Alia (*Malay*), Zungebell (*Pers.*), Siwe (*Amb.*), Inschi kau (*Malabar*), Sepudday (*Malay*).

The ginger plant is a native of the East Indies[2], and is particularly abundant in the mountainous district of *Gingi*, to the east of Pondicherry, whence it derived its name. It is now naturalized to the West Indies, where it flowers in September. The rhizome is perennial, creeping, palmate, fleshy, becoming fibrous, and sending off many long fibres and offsets; the stem is an annual culm, about three feet in height, upright, round, and enclosed in an imbricate, membranous sheathing. The leaves are alternate, linear-lanceolate, six inches to twelve long, equilateral, smooth, and on short embracing petioles. The flowers, which have an aromatic odour, are in a dense, solitary, club-shaped spike, close to the stem, composed of large, upright, ovate, subacuminate, green, striated scales, with a yellow membranous margin, half closing the flowers: the calyx is a small double spathe of a dingy yellow colour, tubular, three-toothed, with the segments of the border conical, and nearly equal: corolla with a double limb: the anther-bearing filament is extended beyond the anther, has an awl-shaped appendage, with a groove to receive the style after it has passed between the lobes of the anthers, and is terminated with a large double, ovate anther: style filiform, with two subulate pointed processes at the base: stigma a compressed ciliated cup: the cap-

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[1] Ζιγγίζερις Dioscoridis. The similarity between the Greek name of the plant and the Sanscrit *sringavera* (horn-shaped) is remarkable. *Asiatic Researches.* vol. xi. p. 346.

[2] It is named *ale* by the Brahmins.

sule is smooth, fleshy, tetragonous, containing many oblong seeds.

The herbaceous part of the plant withers in December; the rhizomes are dug up in January; but when it is intended to be preserved in syrup, it is dug up when the shoots do not exceed five or six inches in height. For preparing the dried ginger, the best pieces are selected, scraped, then washed, and dried in the sun with great care. This is called *white ginger;* in contradistinction to which the rhizomes which are scalded in boiling water before being dried, are denominated *black ginger.* The confected or preserved ginger is prepared by scalding the green rhizomes till they are tender; then peeling them in cold water, and putting them into a thin syrup, from which in a few days they are shifted into the jars in which they come home, and a very rich syrup poured over them, which is sometimes three or four times renewed.[1]

Dried ginger is imported in bags, each containing about one hundred weight. The white kind usually called *Jamaica ginger,* brings the highest price, being more pungent and better flavoured than the black or *East Indian.* The external characters of goodness in either are soundness, heaviness, and firmness: the pieces that are light and soft, worm-eaten, or very friable and fibrous, should be rejected. The confected ginger is nearly translucent when good.

Qualities. — Dried ginger has a pungent aromatic odour, and a hot biting taste. Its odour appears to depend on a volatile oil, which can be obtained separate in distillation with water, and has all the flavour, but none of the pungency of the root. Water, alcohol, and ether extract its virtues. The greater part of ginger root, however, is starch. To separate it, triturate the root with water, and strain through cloths: then after the fecula, which is suspended in the water, has subsided, separate it by decanting off the water, and macerate in alcohol; what remains undissolved is a tolerably pure insipid starch. The pungency resides in a resino-extractive matter which is combined with the fecula, but may be obtained separate by evaporating the ethereal tincture on the surface of water. M. Morin and Rouen have analyzed ginger, and give the following as its components: — Resin soluble in ether, resinous matter insoluble in ether, a bluish-green volatile oil, vegeto-animal matter, a substance analogous to osmazome.

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[1] In Jamaica, the shifted syrup is diluted with water, and fermented into a pleasant liquor, called cool-drink, with some mixture of lignum-vitæ and sugar. *Long's Jamaica.*

acetic acid, acetate of potassa, starch, gum, sulphur, several oxides, and lignin.[1]

Medical properties and uses. — Ginger is stimulant, carminative, and sialogogue. It has been found useful in flatulent cholic, dyspepsia, and tympanitis; and in gout when it attacks the stomach. It is less frequently used alone than as an adjunct to other remedies, to promote their efficacy and give them warmth. The local stimulus of ginger, when chewed, excites the salivary glands, and provokes a considerable flow of saliva: hence it has been found useful as a sialogogue in relaxations of the uvula and tonsils, and in paralysis of the muscles of the tongue and fauces.

The dose of powdered ginger may be from grs. x. to ℈ j.

Officinal preparations. — *Syrupus Zingiberis*, L. E. D. *Syrup. Rhamni*, L. *Tinctura Zingiberis*, L. D. *Tinct. Cinnamomi comp.*, L. *Tinct. Rhei comp.*, L. *Acid. Sulphur. aromat.*, E. D. *Confectio Opii*, L. D. *Confect. Scammonii*, L. D. *Infusum Sennæ comp.*, L. D. *Pulvis Cinnam. comp.*, L. E. D. *Pulvis Jalapæ comp.*, L. *Pulv. Scammonii comp.*, L. D. *Pulv. Sennæ comp.*, L. D. *Pilulæ Hydrargyri Iodidi*, L. *Pilulæ Scillæ*, D. *Pilulæ Scillæ comp.*, L. *Pilula Aloes composita*, D. *Vinum Aloes*, E. D.

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[1] *Journ. de Pharm.* Juin, 1823.

PART III.

PREPARATIONS AND COMPOUNDS.

ACIDS.

THOSE substances which, in a liquid state, have a sour taste; and are capable of combining with alkalies, earths, and metallic oxides, while at the same time they lose their acidity, and form compounds named neutral salts, in which the properties of the acid, the alkali, the earth, or the oxide employed, are lost, were formerly regarded as *acids;* but the discovery of the hydracids proved that oxygen is not essential to acidity. Many of them change to red, the blue, purple, and green colours of vegetables; and unite with water in almost every proportion: but others are insoluble, have no taste, and do not affect litmus: others do not fully neutralize potassa; thence the old definition of acids must be set aside. Chemists now regard all bodies as acids which unite with potassa or ammonia, and form salts.

On the supposition that all acids are compounds of oxygen with certain bases, the name of each was derived from the base of which it is formed; from *sulphur*, for instance, comes *sulphuric acid;* but the same base being supposed capable of uniting with different proportions of oxygen, the terminations *ous* and *ic* were added to indicate the degree of acidification: thus, when sulphur is united with the smaller proportion of oxygen, the acid produced is named *sulphurous acid;* when with the full proportion, *sulphuric acid.* One or two acids were, moreover, supposed to combine with a still larger proportion of oxygen, to denote which the syllable *oxy* (for oxygenized) was prefixed: thus hydrochloric acid, which was supposed to be muriatic acid combined with an excess of oxygen, became *oxymuriatic acid:* but farther experience demonstrated this to be an erroneous mode of expression.

The stronger acids require to be kept in glass bottles, furnished with well-ground glass stoppers, and having the name of the acid engraved on the glass. They should be dispensed also in glass-stopped phials. The acids known to chemists are very numerous: but of these a small proportion only is employed for medical and pharmaceutical purposes. In the London Pharmacopœia, they are placed in alphabetical order;

but in this place it may be proper first to exhibit them, in a table, according to the nature of their radicals or base.

I. ACIDS COMPOSED OF A SIMPLE RADICAL AND OXYGEN.	
SULPHUR	1. SULPHURIC ACID.
NITROGEN	2. NITROUS ACID. 3. NITRIC ACID.
CARBON	4. OXALIC ACID.
ARSENIC	5. ARSENIOUS ACID.
PHOSPHORUS	6. PHOSPHORIC ACID.
II. ACIDS COMPOSED OF A COMPOUND RADICAL AND OXYGEN.	
CARBON AND HYDROGEN	1. ACETIC ACID. 2. CITRIC ACID. 3. TARTARIC ACID. 4. BENZOIC ACID. 5. SUCCINIC ACID. 6. GALLIC ACID. 7. TANNIC ACID.
III. ACIDS COMPOSED OF A SIMPLE RADICAL AND HYDROGEN.	
CHLORINE	1. HYDROCHLORIC ACID.
IV. ACIDS COMPOSED OF A COMPOUND RADICAL AND HYDROGEN.	
CYANOGEN, CARBON, NITROGEN.	2. HYDROCYANIC ACID.

ACETUM DESTILLATUM, Lond. *Distilled Vinegar.*

"Take *one gallon* of vinegar, distil the vinegar from a glass retort, placed in a sand-bath, into a glass receiver. Preserve for use the seven pints which are first distilled."

ACIDUM ACETICUM TENUE, Edin. *Weak Acetic Acid.*

"Distil eight pounds of vinegar in glass vessels, with a gentle heat. The pound which first comes over, being too watery, is to be rejected; the five pounds that follow will be the weak acetic acid. The distillation may be continued as long as a colourless acid comes over; but this being too much burnt, and unfit for internal use, may be mixed with the pound which first comes over, and preserved for various chemical purposes."

ACETUM DISTILLATUM, Dub. *Distilled Vinegar.*

"Take of wine vinegar *ten parts* (by measure); distil with a gentle heat *eight parts*. The distillation must be performed in a glass vessel, and the first part which comes over rejected."

The specific gravity of this acid is to that of water as 1005 to 1000.

Syn. Vinaigre distillé (*F.*), Distillirter Essig (*G.*), Azynagtige zuur, (*Dutch*), Aceto distillato (*I.*), Vinaigre distilado (*S.*).

In this preparation the acetic acid is in a purer but more diluted state than that in which it exists in vinegar; being freed in a great degree from the mucilage, extractive, bitartrate of potassa, sulphuric acid, colouring matter, and other extraneous matters which vinegar contains.[1] This distillation is now conducted on a large scale, as the greater part of the fluid sold as distilled vinegar, and that employed for medicinal purposes, is merely diluted pyroligneous acid.

In performing the above processes, it is more important to avoid carrying the distillation too far than to reject the first eighth part which comes over; for although this is undoubtedly weaker, and contains a small portion of alcohol and pyro-acetic acid, yet it retains about one twelfth[2] of the whole quantity of the real acid obtained; thence the London College now orders it to be kept. By continuing the process a little too long, the whole product acquires an unpleasant empyreumatic flavour. This is avoided by changing the receiver rather before the quantity ordered has been obtained; and, if to the residue be added an equal quantity of hot water and half an ounce of recently burnt animal charcoal, for every pint of fluid in the retort, the distillation may be recommenced, and an additional portion of the diluted acid will be obtained, equally pure and strong as the former. At the end of the operation, when dilution has not been employed, the residue is a dark brownish red coloured liquor, strongly acid, very empyreumatic, and which deposits bitartrate of potassa. Mr. Brande justly regards as an improvement in the distillation of vinegar the employment of the heat of high-pressure steam, instead of that of an open fire; as both the risk of empyreuma is prevented, and "a larger portion may usually be distilled off before any foreign flavour is perceptible."[3]

Qualities. — Distilled vinegar has a fainter and less agreeable odour than common vinegar; a grateful, not strong, acid taste; is limpid and colourless; and of a specific gravity varying from 1·007 to 1·0095. It should evaporate completely when heated; and afford no precipitate with acetate of lead, or nitrate of silver, or iodide of lead. Neither hydrochloric acid nor ammonia should change its colour. After a plate of silver has been digested in it, it should afford no precipitate with hydro-sulphuric acid. One hundred grains should require thirteen grains of crystallized carbonate of soda for their saturation. It dissolves the gum resins and the active principles of plants, such as those of the squill and the

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[1] See *Acetum*, Part II.
[2] *London Medical Review*, No. x. 125.
[3] *Manual of Pharmacy*, p. 92.

meadow-saffron; and forms acetates with the alkalies and several of the metallic oxides. One hundred parts of distilled vinegar should be saturated by 13 grains of carbonate of soda in crystals, or contain of acetic acid 4·6 + water 96·58 parts. It is sometimes adulterated. Sulphuric acid is detected by a precipitate being produced on the addition of a solution of acetate of baryta; acetate of lead, by the solution of hydriodate of potassa, affording a yellow precipitate, or by a solution of sulphureted hydrogen, forming a dark-coloured precipitate; and acetate of copper, by the acid assuming a blue colour, when supersaturated with ammonia, or affording a brown precipitate with ferrocyanate of potassa.

Medical properties and uses. — The same as those of common vinegar; but, as it is purer, and not liable to spontaneous decomposition, it is fitter for pharmaceutical purposes.

Officinal preparations. — *Liquor Ammoniæ Acetatis,* L. E. D. *Potassæ Acetas,* E. D. *Sodæ Acetas,* D. *Ferri Acetas,* D. *Plumbi Acetas,* E. D. *Liquor Plumbi Diacetatis,* L. *Acetas Opii,* D. *Acetum Colchici,* L. *Acetum Scillæ,* L. E. D. *Oxymel,* L. D. *Oxymel Scillæ,* L. *Oxymel Colchici,* D. *Oxymel Cupri Subacetatis,* D.

ACIDUM ACETICUM, Lond. *Acetic Acid.*

Take of acetate of soda, *two pounds;* sulphuric acid, *nine ounces;* distilled water, *nine fluid ounces:* add the sulphuric acid, previously mixed with the water, to the acetate of soda put into a glass retort, then distil the acid in a water bath. Care should be taken not to augment the heat towards the end.

Dublin.

" Take of acetate of potassa, *one hundred parts;* sulphuric acid, *fifty-two parts.* Pour the acid into a tubulated retort: then add to it in small portions and at different times, the acetate of potassa, allowing the mixture to cool after each addition; finally, with a moderate heat, distil the acid until the residue be dry.

" The specific gravity of this acid is to that of distilled water, as 1074 to 1000."

ACIDUM ACETICUM FORTE, Edin. *Strong Acetic Acid.*

" Take of dried sulphate of iron, *one pound;* acetate (*superacetate*) of lead, *ten ounces.* Rub them together; then put them into a retort, and distil in a sand-bath with a moderate heat, as long as any acid comes over."

Syn. Acide Acetique (*F.*), Essigäure (*G.*), Azynzuur (*Dutch*), Acido acetico (*I.*).

These processes furnish the same acid as that which is contained in distilled vinegar, but it is completely free from

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extractive and mucilage, and is much stronger. In the processes of the London and the Dublin Colleges, the sulphuric acid, by reason of its superior affinity for soda and for potassa, decomposes the acetates, and sets free the acetic acid; which being volatile, must necessarily come over in a concentrated form, as the acetates contain little or no water, and much of water of the sulphuric acid is retained by the sulphates which remain in the retort.[1] The Edinburgh process is that of Badollier, an apothecary of Chartres[2], with the substitution of sulphate of iron for sulphate of copper. The affinity of the sulphuric acid of the sulphate of iron for the oxide of the acetate of lead, assisted by the heat, decomposes the acetate, the sulphuric acid uniting with the oxide of lead, and the acetic with the oxide of iron; from which, however, it is again disengaged and distils over. M. Lowitz recommends a bisulphate to be used. The dried state of the salts enables the acid to be obtained in a concentrated form.[3] The processes of the London and Dublin colleges are the best; the acid obtained being stronger, not contaminated with any metallic impregnation, and free from sulphurous acid, a small portion of which the acid formed by the Edinburgh process generally contains.

Qualities. — Acetic acid has a grateful, fagrant, pungent odour, a very sour and acrid taste; and when applied to the skin, inflames it and raises a blister. It is limpid, colourless, and highly volatile; its odour is pungent and refreshing, its taste acrid; and, if much concentrated, it takes fire when heated in the open air; and burns with a white light. The sp. grav. of that procured by the London process, is 1·048, in which state it contains, in 100 parts by weight of real acid, 30·7 of water. It becomes solid and crystallizes at 28° of Fahrenheit, liquefying again at 40°, and is also beautifully crystallized when compressed with a force of 1100 atmospheres.[4] It is capable of oxidizing iron, zinc, copper, nickel, and tin; combines with alkalies, earths, and metallic oxides,

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[1] The composition of the acetate of soda is 1 eq. of acid = 51·46 + 1 soda = 31·3 + 6 water = 54 — equiv. 136·76. The primary form of its crystal is an *oblique rhombic prism.*

[2] *Annales de Chimie,* xxxvii. 3.

[3] The process of the edition of the London Pharmacopœia of 1787, for obtaining this acid by the simple distillation by dried acetate of copper, afforded a much stronger acid than either of these processes. An excellent acetic acid is obtained by decomposing the acetate of lead at once, by means of sulphuric acid; putting into the retort, before distilling, a small portion of oxide of manganese, as directed by M. Baup. Vide *Journn. de Pharm.* Dec. 1816.

[4] *Philosophical Trans. for* 1826. Part III. art xviii.

forming acetates; dissolves resins, gum resins, camphor[1], and volatile oils; and combines with alcohol, which, when aided by heat, it converts into a species of ether. With water it unites in any proportion, and during the mixture heat is evolved: a mixture of 15 parts of it with 85 parts of water, is equal in strength to distilled vinegar. From the experiments of Gay Lussac, 100 parts of pure acetic acid, free from water, or as it exists in dry acetate of potassa, appear to consist of 50·224 of carbon, 5·629 of hydrogen, and 44·147 of oxygen: or of 4 equivalents of carbon = 24·48 + 3 of oxygen = 24 + 3 of hydrogen = 3, making the equivalent = 51.48. But the strength of acetic acid can only be determined by its specific gravity. Thus, at 60° Fahr. acid of 1·06296 specific gravity contains of acid 1 atom + 1 atom of water, making the equivalent 60·48. That of the London college contains 30·8 of anhydrous acid + 69·2 of water in 100 parts.

Tests. — One hundred grains of this acid saturate eighty-seven grains of crystallized carbonate of soda.[2] Its specific gravity is 1·048. Its purity is ascertained by diluting it with water, and testing as for distilled vinegar.

Incompatibles. — Alkalies and their carbonates, alkaline earths and their carbonates.

Medical properties and uses. — Acetic acid is stimulant and rubefacient. It is principally employed as a refreshing scent, in syncope, asphyxia, and nervous headachs; and for obviating the unpleasant smell of the confined air of crowded assemblies and of the sick room. It may be used as a counter-irritant, when applied to the skin, in cynanche tonsillaris, croup, and other internal inflammations. It is, also, an excellent application to warts and corns, which it seldom fails to remove; but in applying it, care must be taken to avoid eroding the surrounding skin. It is a useful and powerful substitute for a blister, when the effect of such an application is required to be rapidly obtained.

Officinal preparation.—*Acidum Aceticum Camphoratum,* E. D. *Acetum Cantharidis,* L. *Potassæ Acetas,* L. *Plumbi Acetas,* L. *Oxymel,* L.

ACIDUM BENZOICUM, Lond. *Benzoic Acid.*

"Take of benzoin, *one pound.* Put the benzoin into a proper vessel placed in a sand-bath, and the heat being gradually increased, sublime until nothing more ascends; press the sublimed matter wrapped in bibulous paper, and being separated from the oily parts, sublime it again.

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[1] *Henry's Aromatic Vinegar* is a solution of camphor, and some essential oil, in acetic acid.

[2] Phillips.

Edinburgh.

"Take of benzoin, *twenty-four ounces;* subcarbonate of soda, *eight ounces;* water, *sixteen pounds.* Triturate the balsam with the subcarbonate; then boil them in the water for half an hour, stirring them constantly, and strain. Boil the residue of the balsam in other six pounds of water, and strain. Mix the strained liquors, and evaporate to two pounds: filter again, and drop in diluted sulphuric acid as long as any precipitation is produced.

"Dissolve the precipitated benzoic acid in boiling water: strain the liquor whilst it is hot through linen, and set it aside to crystallize. Wash the collected crystals with cold water; then dry and preserve them for use."

Dublin.

"Take of benzoin *five parts;* fresh burnt lime, and muriatic acid, of each *one part;* water *two hundred parts.* Rub the benzoin with the lime, then boil the mixture in one hundred and thirty parts of water, for half an hour, stirring constantly with a spatula, and leaving the vessel at rest, decant the liquid when it is cold. Boil the residue in seventy parts of water, and again decant the liquid when it is cold. Mix the liquors, and boil to one half; filter through paper, and when cold, drop in gradually the muriatic acid. Finally, pour off the fluid, put the precipitated powder, previously washed in a small quantity of cold water, and dried with a gentle heat, in a proper vessel, and sublime the benzoic acid with a moderate fire."

Syn. Acide Benzoique (*F.*), Benzoesäure (*G.*), Benzoin zuur (*Dutch*), Acido Benzoico (*I.*).

The process of the London college is nearly the same as that recommended by Chaptal: but although a greater quantity of the acid is thus procured, yet, if the fire be not very nicely regulated, the portion of empyreumatic oil volatilized, which gives the acid the peculiar odour of the benzoin, and a yellowish tinge is so great, that it cannot be entirely separated from it, even by the second sublimation after pressure between bibulous paper.[1] The Edinburgh process is that of Gren, which is a modification of that of Scheele, published in 1775.[2] Carbonate of soda separates the benzoic acid from the resin, with which it is united in the balsam, combines with it, and forms a benzoate, which is dissolved in the water; whilst at the same time a small portion of resin is also dissolved, and

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[1] This acid was originally obtained by sublimation. It was described under the name of *flowers of benzoin* by Blaise de Vigeneve, in 1608. *Thompson's Chymistry,* 4th edit. 289.

[2] *Scheele,* i. 124.

gives the solution a yellow colour. This benzoate is decomposed in its turn by the sulphuric acid, which combines with the alkali, and forms a sulphate; whilst the benzoic acid that is set free, being insoluble in cold water, precipitates in the form of a brownish powder. A subsequent sublimation frees the acid of this colour, and gives it the crystallized form and brilliant appearance of the acid obtained by sublimation, without any adhering oil.

The Dublin process is a modification of that of Scheele. The lime unites with the acid of the benzoin, and forms a benzoate, which is decomposed by the hydrochloric acid, and precipitates the insoluble benzoic acid thus set free. The subsequent sublimation purifies and crystallizes the acid.[1]

Benzoic acid may also be extracted from the other balsams: it has been detected by Vogel in the flowers of Trifolium *melilotus officinalis;* and is also found in the urine of the cow and that of other ruminantia.

Qualities. — Benzoic acid, when perfectly pure, is inodorous; but as it is usually found in the shops, it has a slight aromatic odour[2]: its taste is pungent, sweetish, acrid, and acidulous. The pure sublimed acid is in feathery or flocculent crystals, soft to the touch, and not pulverulent, of a beautiful whiteness, and a silky lustre. Its specific gravity is 0·657. When heated, it melts, emits a suffocating acrid vapour, and in a strong heat burns with a white flame. Benzoic acid is soluble in twenty-four times its weight of boiling water; but the water lets fall nineteen-twentieths in cooling. Cold alcohol takes about one half its weight; boiling alcohol its own weight of this acid; the addition of water precipitates the acid. It is also soluble in hot acetic acid; and also without change in concentrated sulphuric and nitric acids. With the alkalies, earths, and metallic oxides, it forms benzoates, which are not used in medicine. According to Berzelius, it is a triple compound of 74·41 of carbon, 5·16 of hydrogen, and 20·43 of oxygen; or, according to Liebig and Wöhler, of 14 equiv. of carbon = 85·68 + 5 of hydrogen = 5 + 3 of oxygen = 24, making the equivalent = 114·68. These chemists regard it as a compound of *benzule*, a compound of 14 eq. carbon = 85·68 + 5 hydrogen = 5 + 2 oxygen = 16, to which 1 eq. of oxygen being added, benzoic acid is formed. The crystals contain no water.

Medical properties and uses. — This acid is stimulant; but, although it is retained by all the Pharmacopœias, it is of little value as a remedy.

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[1] During its sublimation light is evolved.

[2] To free it from the oil on which its odour depends, dissolve it in alcohol, and precipitate by water. *Phil. Mag.* xiv. 331.

Officinal preparations. — *Tinctura Camphoræ composita,* L. D. *Tinctura Opii Ammoniata,* E.

ACIDUM CITRICUM, Lond. *Citric Acid.*

"Take of Lemon juice, *four pints;* prepared chalk, *four ounces and a half;* diluted sulphuric acid, *twenty-seven fluid ounces and a half;* distilled water, *two pints.* Add the chalk by degrees to the lemon juice heated, and mix them; set by, that the powder may precipitate; then pour off the supernatant liquor. Wash the citrate of lime frequently with warm water; then pour on it the diluted sulphuric acid and the distilled water, and boil for fifteen minutes; press the liquor strongly through a linen cloth, and filter it. Evaporate the filtered liquor with a gentle heat, and set it aside, that crystals may form. To obtain the crystals pure, dissolve them in water a second and a third time; filter each solution, evaporate, and set it apart to crystallize."

Dublin.

"Take of lemon juice *any quantity;* prepared chalk, *as much as may be required.* To the lemon juice, heated, add gradually the chalk; then pour off the liquid from the residue of the citrate of lime. Wash this many times in hot water, and then dry it. To the dried powder add eight times the quantity of diluted sulphuric acid, as of chalk previously added; boil the mixture, express it strongly through cloth, and filter the liquid through paper. Evaporate the filtered liquor until crystals form on cooling. The crystals may be purified by repeated solutions and crystallizations."

Syn. Acide Citrique (*F.*), Acido Citrico (*I.*).

This process, which was contrived by Scheele, should never be performed by the apothecary, as the crystallized acid is now manufactured very pure, and sufficiently reasonable, on a great scale.[1] The theory of the process is very simple. The lime of the chalk unites with the citric acid which exists ready formed in the lemon juice, expels the carbonic acid, and produces an insoluble citrate of lime, which precipitates. Any mucilage it retains may be removed by repeated washings; and the sulphuric acid, which is added to the dried citrate, decomposing it, owing to the superior affinity of the sulphuric acid for lime, an insoluble sulphate of lime forms, and is precipitated, while the citric acid is disengaged, remains in a solution, and is crystallised by evaporation. The crystals of the first crystallisation are dark coloured; which is partly owing to a portion of mucilage which still adheres to the

[1] The principal manufacturer in London is Mr. Coxwell, of Fleet Street.

citric acid, and partly to the excess of sulphuric acid acting on the citric acid and decomposing a portion of it. The repeated crystallisations free the crystals from this dark colour; but as it is of some importance to avoid any hurtful excess of sulphuric acid, and as the strength of lemon juice is variable and uncertain, it is better to determine the quantity of acid required by the quantity of chalk employed. For this purpose a portion of the sulphuric acid intended to be used must be previously saturated with the chalk, and the weight of the portion employed accurately ascertained; by the knowledge of which the exact quantity of sulphuric acid required to decompose the citrate may be found. According to the experiments of Proust[1], 94 ounces of lemon juice saturate 4 ounces of chalk with citric acid, and produce $7\frac{1}{2}$ ounces of dry citrate, which require for their decomposition, and the complete saturation of the lime they contain, 20 ounces of diluted sulphuric acid, composed of one part of the common acid, and three parts of water, or of a specific gravity of 1·15. To ascertain, however, the exact point of saturation of the lime with the sulphuric acid, take a little of the clear supernatant fluid, filter it, and add to it a few drops of acetate of lead; if no sulphuric acid be present, citrate of lead only will be formed, soluble in nitric acid, which does not dissolve sulphate of lead.[2]

Qualities. — Pure citric acid is in white, transparent, and persistent crystals. The primary crystal is a right rhomboic prism; in general, however, it is variously modified. It is inodorous; has an extremely acid, almost caustic taste; and reddens strongly the vegetable blues. In a damp air, the crystals absorb moisture. Seventy-five parts of water at 60° Fahrenheit dissolve one hundred parts of this acid; and at 212° twice their weight. The weak solution, when long kept, is liable to become mouldy and to undergo spontaneous decomposition. Citric acid combines with the alkalies, earths, and metallic oxides, and forms citrates. The sulphuric and nitric acids decompose it. Its components, according to Berzelius, are 41·369 carbon, 3·800 hydrogen, and 54·831 of oxygen; according to Dr. Prout, they are carbon 34·28, oxygen 22·87, water 42·85. In its crystallized state the crystals contain of citric acid 76·32, water 23·68, in 100 parts[3]; in equivalents it consists of 4 of carbon = 24·48 + 2 of hydrogen = 2 + 4 of oxygen = 32, making the equivalent of the

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[1] *Journal de Physique*, lii. 366.

[2] Citric acid may be also obtained from the juice of the cranberry, vaccinium *oxycoccus;* bird-cherry, prudus *padus;* bitter-sweet, solanum *dulcamara;* and dog-rose, rosa *canina.*

[3] *Phillips's Translations of Pharm.* p. 23.

anhydrous acid 58·48: but the crystallized acid containing $1\frac{1}{2}$ eq. of water = 12·5, its equivalent is 70·98. Citric acid is sometimes adulterated with tartaric acid; or with citrate of lime. The first is discovered by adding to the solution of the acid to be tested a solution of any salt of potassa, when an insoluble bitartrate, in small brilliant crystals will be formed if the tartaric acid be present; the second is detected by dissolving the crystals in water, saturating the solution with ammonia, and adding to it some oxalate of ammonia, which will instantly precipitate the lime, if present. If it be mixed with sulphate of potassa, the solution will yield a precipitate with chloride of barium, which is insoluble in hydrochloric acid. Any substance remaining when the acid is subjected to the action of fire, is an impurity.

Medical properties and uses.—The solution of this acid in water, in the proportion of nine drachms and a half of the crystals to Oj. of water, answers nearly all the purposes of recent lemon juice for forming the common effervescing draught with carbonate of potassa. The following table shows the quantity of citric acid required to saturate one scruple of the alkaline salts mentioned in it:—

Alkaline Salts.	*Citric Acid.*
Bicarbonate of Soda. gr. xx.	gr. x.
Carbonate of Soda, gr. xx.	gr. xij.
Bicarbonate of Potassa, gr. xx.	gr. xiv.
Carbonate of Potassa, gr. xx.	gr. xvij.
Sesquicarbonate of Ammonia, gr. xx.	gr. xxiv.

A solution of ℈j. in Oj. of water, sweetened with sugar that has been rubbed on fresh lemon peel, forms a grateful refrigerent beverage, resembling lemonade; and which is equally useful in febrile and inflammatory complaints. It is said that the crystallized acid is not so useful in scurvy as the juice of the fresh fruit. Citric acid is incompatible in formulæ with the alkalies, the alkaline and earthy carbonates and acetates, the earthy and alkaline sulphurets, soaps, and tartrate and bitartrate of potassa.

ACIDUM HYDROCHLORICUM, Lond.[1] *Hydrochloric Acid.*

"Take of dried chloride of sodium, *two pounds;* sulphuric acid (by weight), *twenty ounces;* distilled water, *twenty-four ounces.* First mix the acid with twelve ounces of the water, in a glass retort; and when the mixture is cold, add to it the chloride of sodium. Pour the remainder of the water into the receiver; and having fitted it to the retort placed in a sand bath, distil over the acid into this water, with a heat gradually raised."

Edinburgh.

"Take of muriate of soda, which had been previously exposed to a red heat, sulphuric acid, water, of each *two pounds.* Pour the acid, mixed with eight ounces of the water, and cooled, upon the muriate of soda, in a glass retort; to which adapt a receiver, containing the remainder of the water, and distil from a sand bath with a moderate fire. In a short time the vessels may be luted together, and the distillation continued to dryness.

"The specific gravity of this acid is, to that of distilled water, as 1·170 to 1·000."

Dublin.

"Take of muriate of soda dried, *one hundred parts;* sulphuric acid of the market, *eighty-seven parts;* water, *one hundred and twenty-four parts.* Dilute the acid with half of the water, and after it is cold add it gradually to the muriate of soda put into a glass retort. Put the remainder of the water in the receiver, that it may absorb the elastic gas as it comes over: then distil the liquor until the residuum become dry.

"The specific gravity of this acid is, to that of distilled water, as 1·160 to 1·000."

Syn. Acide Muriatique (*F.*), Kochsalzäure (*G.*), Zoutzuur (*Dutch*), Acido Muriatico (*I.*), Ooppoo trăvagum (*Tam.*).

The principal difference in these formulæ is in the quantity of sulphuric acid ordered for decomposing the chloride. The sulphuric acid is properly ordered to be diluted, to moderate the strong action, and to prevent the too rapid disengagement of the hydrochloric acid gas, which would both endanger the bursting of the apparatus, and render the process otherwise very unmanageable. The directions of the London and Edinburgh Colleges, to put part of the water into the receiver, is preferable to mixing the whole with the acid, and pouring

[1] Spiritus Salis, P. L. 1720. Spiritus Salis Marini Glauberi, P. L .1745.

it on the chloride, as it facilitates very much the condensation. In the manufacturing laboratories, although the process is in principle the same as the above, yet the retort is generally of earthenware or of iron, which communicates the yellow colour that characterises the common hydrochloric acid, and which depends on a small portion of iron being raised and brought over with the acid. Even when iron vessels are not employed, the acid often assumes a yellowish colour, which depends either on a small portion of iron in the salt, or on the presence of some chlorine. The acid is rendered pure by redistillation.

These processes are easily explained. Common salt is a compound of 35·42 parts of chlorine and 23·3 of sodium, and consequently contains neither hydrochloric acid nor soda; but, when the sulphuric acid is added to the salt, 1 equivalent of water is decomposed, its oxygen unites to the sodium, and forms soda, which combining with the sulphuric acid produces a sulphate of soda, while its hydrogen combines with the chlorine, and forms anhydrous hydrochloric acid, a gaseous fluid consisting of equal volumes of hydrogen and of chlorine, or 1 equivalent of hydrogen = 1, + 1 of chlorine = 35·42 parts, which dissolving in the water contained in the receiver constitutes the liquid acid. The residue of the process is sulphate of soda with an excess of acid, or a bisulphate; to separate which, without breaking the retort, boiling water may be poured into the retort, after its contents have cooled down to 212°.

Qualities. — Liquid hydrochloric acid, thus obtained, is a colourless or a very pale straw-coloured fluid: it has a strong pungent odour, and an intensely sour taste; it reddens strongly the vegetable blues, emits white suffocating fumes when exposed to the air, and erodes animal and vegetable substances. It is wholly vaporized by heat. It unites with the alkalies, forming hydrochlorates; but when it acts upon metals or metallic oxides chlorides are formed: in the first instance, the hydrogen of the acid is given off in a gaseous form, and the chlorine unites with the metal; in the second, the hydrogen unites with the oxygen of the oxide, and forms water. The acid obtained by the process of the London College of the sp. gr. 1·160, consists of nearly 32·4 of real acid gas, and 67·6 of water: 100 grains of it should saturate 132 grains of crystallized carbonate of soda. The following part of a table, constructed by Mr. E. Davy, shows the quantity of real hydrochloric acid gas contained in 100 parts of fluid acid of different densities, at the temperature of 60°: —

Spec. Grav.	Real Acid Gas.	Spec. Grav.	Real Acid Gas.	Spec. Grav.	Real Acid Gas.
1·21	42·43	1·14	28·28	1·07	14.14
1·20	40·80	1·13	26·26	1·06	12·12
1·19	38·38	1·12	24·24	1·05	10·10
1·18	36·36	1·11	22·30	1·04	8·08
1·17	34·34	1·10	20·20	1·03	6·06
1·16	32·32	1·09	18·18	1·02	4·04
1·15	30·30	1·08	16·16	1·01	2·02

The fluid hydrochloric acid found in the shops often contains sulphuric acid, sometimes nitric, with small portions of oxide of iron; the first is detected by diluting the acid with 5 or 6 parts of distilled water, and adding a few drops of chloride of barium [1], which is precipitated white if sulphuric acid be present; nitric acid is detected by the property of dissolving gold leaf; iron is discovered by ferrocyanate of potassa producing Prussian blue. If much chlorine be present it will decolour solution of indigo.

Medical properties and uses. — This acid is tonic and antiseptic. It has been efficaciously used in typhus fevers, and in some cutaneous eruptions. It is a common and useful adjunct to gargles, in the proportion of from f ʒss. to f ʒij. in f ℥vj. of any fluid, in ulcerated sore throats, and scarlatina maligna; and, in a very highly diluted state, viz. ♏ viij. in f ℥iv. of water, it has been recommended as an injection in gonorrhœa.

This acid has even been regarded as an antidote in general syphilitic affections; but the observations of Mr. Pearson have showed this opinion to be erroneous; yet, by its salutary effects on the stomach and general health, "it is a medicine capable of ameliorating the appearance of venereal ulcers, and of restraining for a time the progress of the disease," where it is desirable "to gain a little time, previously to the entering on a mercurial course." [2] The dose is from ♏ x. to ♏ xx. in a sufficient quantity of water, or in any bland fluid. It is incompatible in prescriptions with alkalies and their carbonates, most of the earths, and the oxides, sulphuret of potassium, and tartrate of potassa, potassio-tartrate of antimony and of iron, nitrate of silver, and acetate of lead. In typhus, and

[1] Strong hydrochloric acid precipitates chloride of barium when no sulphuric acid is present; but this does not happen when the acid is much diluted.

[2] *Pearson on Remedies for Lues Venerea,* 194.

fevers of a typhoid type, I have generally given it in the infusion of cinchona or cusparia bark. Dr. Paris states that he has found it a preventive of the generation of worms, when given after copious evacuations of the bowels.[1] Largely diluted in any mucilaginous fluid, and sweetened, it is a useful remedy in calculous cases depending on an excess of the phosphates.

When hydrochloric acid is taken as a poison, it may be detected by its sensible qualities: but if mixed with wine or other fluids, let a portion of it be distilled from a small retort over a candle, into a phial containing a solution of nitrate of silver: the precipitation of chloride of silver, which is soluble in ammonia, but not in nitric acid, will take place if the poison contain hydrochloric acid. The best antidotes, if exhibited in time, are soap and calcined magnesia, suspended in water.

A very important property of this acid, in the state of gas, is the power it possesses of neutralizing putrid miasmata, discovered by Morveau in 1773. It is therefore used as an agent for destroying infection in sick rooms and hospitals, disengaged by pouring sulphuric acid on common salt.

Officinal preparations.—*Acidum Benzoicum*, D. *Acidum Hydrochloricum Dilutum*, L. *Acidum Nitro-muriaticum.* D. *Acidum Hydrocyanicum*, L. D. *Murias Barytæ*, E. *Solutio Muriatis Calcis*, E. D. *Tinctura Ferri Sesquichloridi*, L. *Tinctura Ferri Muriatis*, E. D. *Solutio Muriatis Calcis*, E. *Antimonii Oxydum nitro-muriaticum*, D. *Hydro-sulphuretum Ammoniæ*, E. *Antimonii Potassio-tartras*, L. *Ferri Ammonio-chloridum*, L.

ACIDUM HYDROCHLORICUM DILUTUM, Lond. *Acidum Muriaticum dilutum*, Dub. *Diluted Hydrochloric Acid.*

"Take of hydrochloric acid, *four fluid ounces*, distilled water, *twelve fluid ounces*. Mix them."

This formula is intended to render the dose of the acid more easily apportioned: one fluid drachm contains about 32 grains of real acid. The dose is ♏ xx. to l x.

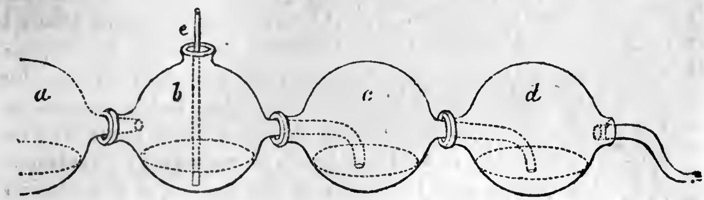
AQUA CHLORINII, Dub. *Chlorine Water.*

"Take of dry muriate of soda, *one hundred parts;* oxide of manganese, *thirty parts;* sulphuric acid, *eighty-seven parts;* and water, *one hundred and twenty-four parts.* Add the acid gradually to the water, and when the mixture is cold pour it on the muriate of soda and the oxide of manganese reduced to fine powder, mixed carefully, and put into a retort; then in a proper apparatus, by means of a gentle heat, moderately augmented, transmit the gas liberated from the mixture through two hundred parts of distilled water, until the effervescence ceases in the retort."

[1] *Pharmacologia*

Chlorine water must be kept in well stopped glass vessels, in an obscure place.

Syn. Acide muriatique oxigéné (*F.*), Vollkomme Salzsäure (*G.*), Orerzuures Zoutzuur (*Dutch*), Acido muriatico ossigenato (*I.*).[1]



In the process by which this solution is prepared, chlorine comes over in the gaseous form, and is washed in the distilled water, which is placed in a Woolfe's bottle, or a globular vessel *a*, connected with a retort containing the mixture that furnishes the chlorine. The gas, as it passes through the water, in part condenses and combines with it, while the uncondensed portion passes on to the other vessels *b*, *c*, *d*, and there combines with the water, forming this solution, which is a solution of chlorine. The safety tube *e* prevents any explosion from the too rapid extrication of the gas. The last receiver should contain a mixture of quicklime in water, to absorb all the superfluous gas.

Chlorine was discovered by Scheele in 1774, while making his experiments on manganese; and was termed by him *dephlogisticated marine acid;* but its nature was not perfectly understood until it was investigated by Sir H. Davy, who discovered that it is an elementary substance, and named it *chlorine*[2], from its colour, which is yellowish green. Its equivalent is 35·42. Cold water absorbs twice its weight of chlorine. When moist chlorine is exposed to a temperature of 32°, yellow crystals are formed.

Qualities. — The saturated solution of chlorine, of the Dublin College, has a peculiar, suffocating odour; and a harsh, styptic, but not acid taste. Its colour is a very pale yellowish green: it destroys all the vegetable colours, rendering them white. It must be kept in opaque bottles, or in a dark place: for by the action of the solar rays, part of the water is decomposed; the hydrogen of which, uniting with the chlorine, forms hydrochloric acid, which remains in solution in

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[1] All these terms are now generally admitted to be erroneous, there being really no such substance as they imply: the composition alluded to is the solution of a simple elementary body, *chlorine*, in water.

[2] From χλωρος, green.

the water, while the oxygen is set free. At a temperature of 50° this solution contains about twice its volume of chlorine. The aqueous solution of *chlorine* acts on almost all the metals, forming chlorides.

Medical properties and uses. — *Aqueous solution of chlorine* is stimulant and antiseptic. It has been strongly recommended in scarlatina and malignant sore throat; and as an antisyphilitic remedy. In the latter disease the same opinion may be given of it as of the simple hydrochloric acid; but in scarlatina and cynanche maligna more benefit has resulted from its use. From f ʒss. to f ʒij. mixed in f ℥viij. of water, and sweetened with a little syrup, may be taken in the course of the day, in divided doses.

But the most important use of chlorine is in its gaseous form, as a fumigation, for neutralizing putrid miasmata, and correcting the infectious atmosphere of hospital wards and rooms in which have been cases of contagious fevers. For these purposes it is better adapted than the common hydrochloric acid gas; but as both of them are highly deleterious to animal life, they should be employed in such apartments only as the sick can be removed from while the gas is extricated. The chlorine is easily procured by pouring f ʒvj. of strong sulphuric acid on a mixture of ʒiv. of pulverized peroxide of manganese, and ʒviij. of dried common salt, in a china cup, which should be placed in a pipkin of hot sand. The doors of the room which is to be fumigated must be kept shut for two hours after the cup or cups with this charge are placed in it; then be thrown open, and a free current of air permitted to pass through the apartment. By this process the offensive odour of the sick room is destroyed, the chemical constitution of the deleterious atmosphere is altered, and its freshness completely restored.

For the more convenient application of this powerful agent, Morveau has invented what he terms disinfecting or preservative bottles. The apparatus consists of a strong glass bottle or phial, covered with a plate of glass, which is fitted by grinding so as to shut, accurately, the orifice of the vessel. The bottle is fixed in a wooden frame; and the plate of glass kept in its place, and closely applied by means of a screw. If the bottle be of 25 cubic inches of capacity, the charge to be put into it may consist of 372 grs. of peroxide of manganese in coarse powder, 3·5 cubic inches of nitric acid of 1·4 specific gravity, and an equal bulk of hydrochloric acid of 1·134 specific gravity. As soon as the charge is introduced, the glass plate must be firmly screwed down in its place. When the apparatus is to be used, the screw is to be turned so as to allow the gas which is extricated to escape from under the plate of glass; and this must be again screwed down, as soon as the smell of the chlorine is perceptible in the distant corners of the apartment. Bottles of any dimensions may be used, but the charge must in no case occupy more than one third part of the capacity of the vessel.

ACIDUM HYDROCYANICUM, Lond.

" Take of ferrocyanide of potassium, *two ounces;* sulphuric acid, *an ounce and a half;* distilled water, *a pint and a half.* Mix the acid with four fluid ounces of the water, and having put them into a glass retort, add the ferrocyanide of potassium dissolved in half a pint of the water. Pour f ℥ viij. of the water into a glass receiver, then having fitted to it the retort, distil f℥ vj. of the acid, with the gentle heat of a sand bath, into this water. Lastly add f ℥ vj. of distilled water to this acid, or as much as suffices, that 12·7 grains of nitrate of silver dissolved in distilled water may be accurately saturated by 100 grains of this acid."

Diluted hydrocyanic acid may also be prepared when it is more immediately wanted, from forty-eight grains and a half of cyanide of silver, added to a fluid ounce of distilled water, mixed with thirty-nine grains and a half of hydrochloric acid. Shake all these in a well stopped phial, and after a short interval pour off the clear fluid into another vessel. Keep this for use, the access of light being prevented.

ACIDUM PRUSSICUM, Dub. *Prussic or Hydrocyanic Acid.*

" Take of cyanuret of mercury [1], *one ounce;* muriatic acid, *seven fluid drachms;* water, *eight fluid ounces.* Distil from a glass retort into a cool receiver eight fluid ounces; and preserve it in a well-stopped bottle, in a cool, obscure place.

" The sp. grav. should be 998 to distilled water as 1000."

This acid is found in many vegetable productions; such as the bark of the prunus *padus*, or bird-cherry; the leaves of the prunus *lauro-cerasus*, and of the peach and nectarine trees; in bitter almonds, and the kernels of many fruits; but, for the purposes of medicine, it is artificially prepared.

In the above process of the London College, the ferrocyanide of potassium is decomposed by the sulphuric acid.

When two equivalents of the ferrocyanide are heated with six of sulphuric acid, three equivalents of the cyanide of po-

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[1] For forming the cyanuret of mercury, the Prussian blue should be purified by digesting it in diluted hydrochloric acid; being washed and dried, add to 8 parts of it 11 of peroxide of mercury, and boil them together in water; a colourless solution is obtained, which, in evaporation, yields pure white crystals of cyanuret of mercury even to the last drop.

tassium which it contains are decomposed, and also three equivalents of water; the oxygen of the latter combining with the potassium of the cyanide converts it into potassa, which unites with the six equivalents of sulphuric acid, and forms a bisulphate of potassa; whilst the hydrogen unites with the three equivalents of cyanogen which are set free, and forms with them three equivalents of hydrocyanic acid. According to Mr. Everitt, whose explanation of the process this is, there remain one equivalent of cyanide of potassium, two equivalents of cyanide of iron, and these combining form what he terms a *yellow salt*, the constitution of which is the opposite of that of the ferrocyanide of potassium, in reference to the proportion of the cyanides.

I find that this yellow salt is only obtained when the process is stopped at the point directed in the pharmacopœia: but when it is carried on to extreme dryness, an additional quantity of the hydrocyanic acid is procured, and the residue consists of bisulphate of potassa, and Prussian blue.

In the process, as ordered by the pharmacopœia, the acid is always obtained of a pale green colour, and requires redistillation to free it from this tint: but the acid procured by continuing the process to dryness is perfectly colourless. There is, therefore, waste in the process of the pharmacopœia: the whole of the acid should be brought over and redistilled, and then diluted to the requisite degree of strength.

In the Dublin process, the bicyanide of mercury is decomposed by the heat, aided by the hydrochloric acid; and the cyanogen uniting with the hydrogen of the water or of the hydrochloric acid, forms hydrocyanic acid vapours, which, coming over in conjunction with the watery vapour into the receiver, constitute the fluid hydrocyanic acid. It generally contains a small portion of hydrochloric acid, which may be separated by redistilling, after the acid has been mixed with a little chalk: the hydrochloric acid is thus left in the retort in combination with the lime of the chalk. The retort employed should be very large; and the acid made in small quantities at a time.

Various other processes may be employed for furnishing this acid. 1. Dissolve ʒ viij. ¼ of cyanide of potassium in ʒ c. of distilled water, and add ʒ xviij. ¾ of tartaric acid dissolved in ʒ xx. of distilled water. In this case, the oxygen which is required to be added to the potassium to form it into potassa, and the hydrogen to the cyanogen to form the hydrocyanic acid, are obtained from the decomposition of the water. The insoluble residue is bitartrate of potassa. 2. Mr. Laming proposes to add alcohol, instead of a portion of the water, to aid the precipitation of the bitartrate, and to preserve the acid from decomposition. 3. Pass a stream of sulphuretted hydrogen through a given quantity of ferro-cyanide of potassium dissolved in a given quantity of water; an insoluble sulphuret of mercury, and a limpid solution of hydrocyanic acid are formed, which can be easily separated by simple decantation. It is necessary, however, to agitate the acid with carbonate of lead, in order to remove any excess of sulphuretted hydrogen which it may hold in solution.

Physical and chemical properties. — Hydrocyanic acid, prepared by the above-described processes, is a colourless, transparent liquid, with an odour which is supposed to be like that of bitter almonds; but it differs materially from that, and is peculiar to itself. It is at first cooling, bland, and sweetish to the taste, but ultimately it impresses a pungent acrimony on the palate. It is very volatile. Its specific gravity is 0·998. It combines in every proportion both with water and alcohol.

It is, when pure, readily decomposed by a high temperature and by light; being resolved into carbonic acid, ammonia, and carbureted hydrogen gas, which are dissipated, and leave behind a carbonaceous deposit. It should, therefore, be kept in an opaque stoppered bottle. It is very inflammable, burning with a blue flame. According to Gay Lussac, it consists of a peculiar base, which he has named Cyanogen, acidified by hydrogen. Cyanogen is a compound, consisting of two eq. of carbon, $= 12·24 + 1$ of nitrogen, $= 14·15$, making the equivalent $= 26·39$, or a bicarburet of nitrogen. But the acid employed in medicine contains one part only of the acid referred to by Gay Lussac, and eight parts and a half of water. The composition of the strong acid is 1·8054 of cyanogen and 0·0694 of hydrogen, or one eq. of cyanogen $= 26·39 + 1$ of hydrogen $= 1$ equiv. 27·39.

Medical properties and uses. — Hydrocyanic acid, when taken into the stomach, in a large dose, acts as an instantaneous and most powerful sedative, destroying completely the nervous energy and the irritability of the body, and consequently extinguishing life: but in an animal thus killed, the action of the heart continues for some time after the animal has apparently ceased to live. The observation of this curious fact led Professor Brera, in 1809[1], to administer hydrocyanic acid as a remedy in pulmonary inflammation; and he found that it quickly subdued the violence of the disease, "without having any recourse to more than one preliminary bleeding."

[1] Brera's work is entitled "Prospetti dei risultamenti ottenuti nella Clinica Medica dell' Imperiale R. Università di Padova, ne' sei anni scolastici, 1809—1815."

British practitioners, however, were altogether unacquainted with this remedy, until after Dr. Majendie published his first essay on this subject in 1815; when Dr. Granville, through the medium of the London Medical Repository, directed their attention to its powers; and I refer those who are desirous of tracing the introduction of hydrocyanic acid into use, as a medicinal agent, to his treatise subsequently published on the internal use of this acid.[1]

Hydrocyanic acid, *internally* exhibited, is a remedy of great efficacy in spasmodic coughs of every description, particularly those of asthma, chronic bronchitis, and hooping-cough. It has also been employed with success in palpitations of the heart.[2] In my own practice, I have witnessed its powers in that affection of the *trachea* which is often mistaken for *phthisis pulmonalis*, and is not less fatal. In true tubercular phthisis, my own experience does not enable me to say much in favour of this acid. It nevertheless sometimes diminishes the violence and the frequency of the cough, and allays the dyspnœa and the difficulty of expectoration. It has been found extremely useful in the treatment of those epidemic catarrhs with which this country is occasionally visited; and no remedy is so well adapted as an adjunct to tonics, for removing those dyspeptic affections which are attended with irritability of the stomach, and accompanied with heat and soreness of the tongue. In these cases it reduces the morbid irritability of the stomach, and enables the juices of that organ to be more slowly secreted, and of a more healthy character.[3] Its beneficial effects in asthma and in hooping-cough are also well established. M. Heller recommends it in aneurism of the heart and aorta.[4] Cases are also on record in which this acid has proved serviceable in the treatment of painful and difficult menstruation, floodings, hæmoptysis, and nervous diseases. It certainly is a very powerful sedative; and may be employed in all cases in which sedatives and narcotics are indicated, with decided advantage.

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1 Treatise on the internal Use of Hydrocyanic Acid, &c. 2d edition, London, 1820.

2 *London Med. and Phys. Journ.* Nov. 1823.

3 Dr. Elliotson published a small volume containing the result of his practice with hydrocyanic acid in dyspepsia; and has stated that accident led him to try the powers of the medicine in this class of diseases. Respect for my own character obliges me to say, that nothing could surprise me more than this statement of Dr. Elliotson; as he acknowledges having read the first edition of Dr. Granville's treatise, which contains a letter from me, dated 20th February, 1819, stating my opinion as to the utility of this acid, in dyspepsia, and explaining the modus operandi of the remedy, previously to his having employed it!

4 Vide *Traité de la Nécessité de ne point insister sur l'Usage intérieur des Excitans dans l'Empoisonnement par l'Acide Hydrocyanique.* Par H. S. Heller. Paris, 1824.

As a *local remedy,* hydrocyanic acid is the only application which can be depended on for allaying the itching and tingling so distressing in impetiginous affections. I have employed it with unvarying success in these complaints, and having published my observations [1], its value has been determined in the hands of others. I have found it useful, also, in combination with small doses of bichloride of mercury in acne *rosacea,* and several other cutaneous diseases.

The dose of hydrocyanic acid is from ♏ ij. to ♏ viij. It may be administered in distilled water, or in almond emulsion, or in infusion of cinchona bark, as circumstances require. When an over-dose has been taken, its deleterious effects are best counteracted by inhaling largely diluted chlorine, by taking hot brandy and water, the ammoniated tincture of iron, and, by artificial respiration. M. Heller recommends bleeding, ammoniacal frictions, and acidulated drink; but more reliance is to be placed on stimulants. As a local application it may be used in the form of lotion, in the proportion of a fluid drachm to five fluid ounces and a half of distilled or of rose water; or as a cataplasm composed of crumb of bread, soaked in a solution of f ʒjss. of the acid in f ℥j. of distilled water. It is incompatible in prescriptions with nitrate of silver, the salts of iron, and the mineral acids.

Although the instantaneous power of hydrocyanic acid, in destroying animal life, when it is taken in doses sufficiently large to operate as a poison, may, perhaps, always prevent medical art from proving beneficial in such cases; yet it is of importance to be able to ascertain in judicial enquiries, relative to suicide or to murder, that this acid has been administered as a poison. This may be done if the animal be opened from eighteen to forty-eight hours after death. Collect the blood contained in the ventricles of the heart, a portion of the contents of the stomach, and of any fluid that may be found in the head, the chest, or the abdomen; agitate the mixture for some time with distilled water, and filter the liquid, and distil at a low temperature. To a small quantity of the distilled liquid, add a few drops of a solution of pure potassa in alcohol; then add a few drops of a solution of protosulphate of iron; and if a reddish precipitate of the colour of burnt terra Siena now fall down, which on the addition of a little sulphuric acid changes to a bluish green, and gradually, on exposure to the atmosphere, becomes a beautiful blue, we may certainly pronounce that the death of the individual has been occasioned by hydrocyanic acid. Another mode of testing is that which M. Lassaigne has pro-

[1] Vide *Medical and Physical Journal,* Feb. 1822.

posed. Suppose a practitioner is called to examine the body of a person who has been poisoned by hydrocyanic acid. The stomach is first to be examined entire, to ascertain whether the odour of that acid is perceptible in it; after which it is to be cut in pieces under *distilled* water, slightly acidulated with sulphuric acid, and a portion of it distilled with an equivalent proportion of the water, until one eighth of the liquid has passed into the receiver. That liquid is to be rendered slightly alkaline with potassa, then a few drops of a solution of sulphate of copper are to be added to a small portion of it, and afterwards a sufficient quantity of hydrochloric acid to redissolve the excess of the oxide of copper. The liquid will appear more or less milky according to the quantity of hydrocyanic acid present. This test will detect $\frac{1}{20000}$ of hydrocyanic acid in solution in water.[1] The presence of the acid in the stomach may be thus detected two or three days after death: but after that period its volatility dissipates it, and it is also decomposed.

ACIDUM NITRICUM, Lond.[2] *Nitric Acid.*

"Take of nitrate of potassa dried, and sulphuric acid, each *two pounds;* mix them in a glass retort; and distil the nitric acid from a sand bath."

Edinburgh.

"Take of nitrous acid *any quantity.* Put it into a retort, and having fitted a receiver, which must be kept cold, apply a very gentle heat, until the reddest part shall have passed over, and the acid which remains in the retort, already almost free from colour, have become nitric acid."

Dublin.

"Take of nitrate of potassa, *one hundred parts;* sulphuric acid of the market, *ninety-seven parts.* Mix in a glass retort, and distil into a receiver fitted with an apparatus for receiving the elastic gas, until the residue in the retort concretes and again liquefies.

"The specific gravity of this acid is, to that of distilled water, as 1·400 to 1·000."[3]

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[1] *Annales de Chim.* xxvii. p. 200.

[2] Acidum nitrosum, P. L. 1787. Spiritus nitri Glauberi. Aquafortis, P. L. 1745. Aquafortis simplex et duplex, P. L. 1720.

[3] For the preparation of this acid on a large scale in this country, rough nitre, with half the weight of sulphuric acid, is employed. These are put into a large glass or earthenware *body*, to which a glass pipe is luted, communicating with an empty receiver, which is connected by means of pipes also, with several other receivers half filled with water.

ACIDUM NITROSUM, Edin. *Nitrous acid.*

"Take of nitrate of potassa bruised, *two pounds;* sulphuric acid, *sixteen ounces.* Pour the acid upon the nitrate of potassa in a glass retort, and distil from a sand bath with a gradually augmented heat, until the iron pot becomes obscurely red hot.

"The specific gravity of this acid is, to that of distilled water, as 1·520 to 1·000."

Syn. Acide nitrique (*F.*), Salpeter säure (*G.*), Zalpeterzuur Skerkwater (*Dutch*), Skedwatter (*Swed.*), Acido Nitrico (*I.*), Pottle Ooppoo trävágum (*Tam.*), Areki Shora (*Pers.*), Maulabker (*Arab.*).

In performing these processes it is advisable to use a retort with an adopter, and to place a small tube in the receiver, which should be tubulated for this purpose. The nitric acid is separated from its combination with potassa, in the nitrate, by the superior affinity of the sulphuric acid for the potassa; which, however, requires to be aided by quantity, a larger portion of sulphuric acid than is necessary for saturating the potassa of the nitrate being used; and also by heat, which volatilizes the nitric acid as it is disengaged. As soon as the materials are heated, orange-yellow vapours are disengaged, which in a short time, as the heat increases, become paler, and continue so until the ingredients in the retort are nearly dry, and the heat is augmented to 500°; when, owing to a partial decomposition of the acid next disengaged, nitrous gas comes over in deep red fumes, with a quantity of permanently elastic, pure oxygen, which may be collected in an inverted receiver filled with water, placed in a pneumatic trough, and connected with the last of the receivers by means of a bent tube. The nitrous gas combines with the condensed acid in the receiver, deepens its colour, and gives it that form which, according to the Edinburgh College, constitutes nitrous acid. It is with the view of preventing this, that the London College has ordered so large a portion of sulphuric acid to be employed, the principal use of which appears to be to contribute a sufficient portion of water to preserve the constitution of the nitric acid. The Edinburgh College orders the acid to be kept in its coloured state; and as a medical agent it answers the same purposes as the colourless acid; for when both are diluted with water they have the same colourless limpid appearance, and are brought to the same state, the addition of the water expelling completely the nitrous gas, which is only loosely united with the nitric acid. The quantity of acid obtained by the Edinburgh process is about half the weight of the nitrate employed; and the residue is a white, spongy, saline cake of sulphate of potassa, mixed with a bisulphate, which may be dissolved out of the retort by hot water.

By the London process the nitric acid is obtained not altogether free from nitrous gas. In the expulsion of the nitrous gas, to change the nitrous acid into nitric acid, according to the directions of the Edinburgh College, a portion of the acid is carried over with the gas, which should not be wasted, but should be condensed by a small portion of water being put into the receiver, and thus it will form a diluted acid. Dr. Murray [1] justly remarks, that the heat of a water bath is best adapted for this operation, being sufficient for the purpose, and not too great to produce the decomposition of the acid. A completely colourless acid, however, is not obtained, unless the acid be redistilled from a small portion of black oxide of manganese; but this is not at all necessary for medical purposes. [2]

As nitre sometimes contains a small portion of chloride of sodium, nitric acid, in whatever method it has been procured, may be contaminated with a minute portion of hydrochloric acid, or it may contain some sulphuric acid, if the acid have not been introduced into the retort by means of a retort funnel: the presence of the first is detected by dropping in nitrate of silver, which forms an insoluble chloride of silver; while the formation of a precipitate on the addition of nitrate of baryta discovers the second; but both the acid to be tested and the nitrate of baryta should be previously diluted with distilled water: if any undecomposed nitrate be present, it will be detected by evaporating a portion of the acid, when, if it contain no nitre, it will have no residue. These contaminations do not affect the medicinal virtues of the acid.

Qualities.—Nitrous acid, as the term is understood in the Edinburgh Pharmacopœia, is a yellow or orange-coloured fluid, emitting, when exposed to the air, deep orange-coloured, suffocating fumes. In its chemical affinities and other qualities, it agrees in many respects with nitric acid. It consists of nitrous gas loosely combined with nitric acid and water; and the colour varies according to the proportion of nitrous gas which is present. From experiments made by Sir H. Davy [3] on this subject, the following appear to be the proportions in the three states in which nitrous acid is usually procured for pharmaceutical purposes: —

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[1] *System of Materia Medica,* ii. 184.

[2] Nitric acid was first obtained by Raymond Lully, in the 13th century, by distilling a mixture of nitre and clay: a process still employed on the Continent. The name *nitric acid* was imposed in 1787, by the French chemists.

[3] *Researches,* 37.

100 Parts of Acid.	Spec. Gravity.	Real Nitric Acid.	Water.	Nitrous Gas.
Pale yellow	1·502	90·5	8·3	2·00
Bright yellow	1·500	88·94	8·10	2·96
Dark orange	1·480	86·84	7·6	5·56 [1]

The Edinburgh College states the specific gravity too high, for it seldom exceeds 1·502.[2] When one part by weight of water is added to four parts of yellow nitrous acid, the colour is altered to a fine green; when equal parts of both are mixed, it becomes blue; and by another addition of water, or by allowing it to stand exposed to the air, it changes to a very pale straw-colour, or becomes nearly colourless.

Liquid nitric acid is a colourless, or very pale yellow limpid fluid, emitting, when exposed to the air, white, suffocating vapours, and possessing strong acid properties. If the yellow acid be heated in a retort it becomes colourless. It is highly corrosive, and tinges the skin yellow, the tint remaining till the epidermis peel off. When exposed to the air, it attracts moisture and becomes weaker. It unites with water in every proportion, and while mixing heat is evolved. Eighty-one grains of the officinal acid neutralize 217 grains of carbonate of soda. The following table, constructed by Sir H. Davy [3], shows the quantity of real acid and water contained in 100 parts of fluid acid of different densities: —

100 Parts Nitric Acid of Specific gravity.	Contain of		100 Parts Nitric Acid of Specific gravity.	Contain of	
	True Acid.	Water.		True Acid.	Water.
1·5040	91·55	8·45	1·3186	52·03	47·97
1·4475	80·39	19·61	1·3042	49·04	50·96
1·4285	71·95	28·35	1·2831	46·03	53·97
1·3906	62·96	37·04	1·2090	45·27	54·73
1·3551	56·80	43·12			

Nitric acid is volatilized by heat, and decomposed by light. It is also decomposed by all the simple combustibles, and by some, namely, phosphorus, charcoal, and sugar, with great

[1] Anhydrous nitric acid is procured by exposing dry nitrate of lead to a low red heat. The acid of the nitrate is resolved into nitrous acid and oxygen; if the receiver be kept cool, the former condenses into a liquid.

[2] Rouelle states the specific gravity of the strongest nitric acid that can be procured to be 1·583; Kirwan makes it 1·5543 only, at 60° Fahrenheit.

[3] *Researches*, p. 41.

violence of action, which is accompanied with the evolution of copious red fumes. When poured on volatile oils, it sets them on fire; it is capable of oxidizing all the metals; and combines with the earths, alkalies, and metallic oxides [1], forming nitrates; one fluid ounce of specific gravity 1·500 should dissolve 476 grains of white marble. The constituents of nitric acid, independent of the water, which gives it the fluid form, are 25·93 nitrogen, and 74·07 oxygen in 100 parts; or 1 equivalent of nitrogen $= 14{\cdot}15 + 5$ of oxygen $(8 \times 5) = 40$, making its equivalent $= 54{\cdot}15$. The strongest fluid acid (sp. gr. 1·5) contains more than 20 per cent. of water, and 80 of dry acid, or 1 equiv. of dry acid $= 54{\cdot}15 + 2$ of water $= 18$, making the equivalent 72·15. The nitric acid of the shops often contains sulphuric or hydrochloric acid.

It is incompatible with sulphate of iron, tinctures made with alcohol, oxides, earths, alkalies and their carbonates, and the sulphurets.

Medical properties and uses. — Strong fluid nitric acid is seldom employed except for pharmaceutical purposes; but it has been lately recommended as an escharotic in sloughing phagedænic ulcers by Mr. Welbank. To employ it properly, the surface of the ulcer must be well cleansed and dried, and, after applying a thick coating of lard to protect the surrounding sound skin, a pledget, moistened with the undiluted acid, must be pressed steadily on every point of the diseased surface, which by this treatment soon throws off a slough, and assumes an healthy aspect.[2] When extricated in the form of vapour, it is employed for destroying contagion. It is less powerful than the chlorine, but it can be extricated in the chambers of the sick without proving uncomfortable.[3] For this purpose f ʒ ij. of sulphuric acid may be poured over ʒ iv. of coarsely powdered nitre in a china cup, and placed in a pipkin of hot sand. This quantity is sufficient for fumigating a room of ten feet square; and, where a larger portion is required, it is more advisable to multiply the number of pipkins, than to put a larger quantity of the materials into one vessel.

Officinal preparations.—*Acidum Nitricum Dilutum*, L. E. D. *Acidum Nitro-muriaticum*, D. *Argenti Nitras*, L. E. D. *Antimonii Oxydum Nitro-muriaticum*, D. *Hydrargyri Persulphas*, D. *Ung. Hydrargyri Nitratis*, L. E. D. *Hydrargyri Nitrico-oxy-*

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[1] In its concentrated state, it does not act upon the metals at ordinary temperatures; but when slightly diluted, it quickly oxidizes them and dissolves the oxides. This is owing to the decomposition of the water, which yields up its oxygen to the metal, which in a state of oxide is readily soluble in the acid. It does not act on platina or gold.

[2] *Medico-Chirurg. Trans.* vol. ix. p. 69.

[3] *The Effects of Nitrous Vapour, &c. by J. C. Smyth, M. D.*

dum, L. D. *Spiritus Ætheris nitrici*, L. E. D. *Unguentum Acidi nitrosi*, E. D.

ACIDUM NITRICUM DILUTUM, Lond. *Diluted Nitric Acid.*

"Take of nitric acid, *one fluid ounce;* distilled water, *nine fluid ounces.* Mix."

Dublin.

"Take of nitric acid, *three parts by measure*, and of distilled water, *four parts by measure.* Mix, avoiding the noxious vapours. The specific gravity of this mixture is, to that of distilled water, as 1280 to 1000."

ACIDUM NITROSUM DILUTUM, Edin. *Diluted Nitrous Acid.*

"Take of nitrous acid and of water *equal weights.* Mix, avoiding the noxious vapours."

These processes are intended for the more convenient apportionment of the dose in the exhibition of this acid.

When prepared according to the directions of the London College, f ℥j. contains about grs. 72 of nitric acid, of 1·030 specific gravity, and 100 grains containing 14·3 grains of the concentrated acid, will saturate 31 grains of crystallized carbonate of soda; while the same measure of the same acid prepared after the Edinburgh and Dublin formulæ, contains grs. 390·5 of the same acid; a difference which may lead to errors in practice; and is therefore to be regretted.

Medical properties and uses. — Nitric acid is tonic and antiseptic. When very largely diluted with water, it forms an agreeable and very useful beverage in fevers, particularly of the typhoid type. In larger doses, less diluted, it has been efficaciously administered in chronic hepatitis, even when dropsy has supervened; and has also been found serviceable in restraining violent sickness, in dyspepsia, asthma, and the majority of the cachexiæ. From some observations of Dr. Scott, published at Bombay, in 1796, this acid excited considerable attention as a remedy for syphilis; but after the most ample trials, by almost every practitioner of any eminence in the country, its anti-syphilitic powers have not been found by any means to answer the accounts of them transmitted from India. The subsequent publications of Dr. Scott, however, have shown, that he did not employ nitric acid, but a mixture of three parts of hydrochloric acid, and two of nitric. It checks for a time the progress of the disease, but does not permanently remove the symptoms; and as Mr. Pearson justly remarks, "it would by no means be warrantable to substitute the nitrous (or nitric) acid in the place of mercury, for the cure of venereal[1] complaints." It is, however, in many cases, of much benefit during a mercurial course, or prior to its commencement, when the constitution is impaired, and inadequate to support the effects of mercury; as by its tonic powers it promotes the general health, and lessens the action of the mercurial remedy on the mouth and fauces; yet, when it is pushed far, it affects the mouth and produces ptyalism.[2] When dropsy supervenes on reiterated courses of mercury, which is not unfrequent in broken-down constitutions, this acid, Mr. Carmichael observes, given in as large doses as the stomach will permit, conjoined with digitalis, is productive of the utmost benefit. We have found it of considerable service, given at the same time with mercury, in old obstinate ulcerations of the legs, although no venereal taint could be suspected; and it is employed with benefit as a local stimulant, in the form of lotion, in the proportion of f ʒij. of the diluted acid, to Oj. of water, to fetid ulcers, attended with a thin ichorous discharge, and in caries of the bones. In India, and in this country, for some years past, nitric acid has been used, combined with hydrochloric acid, in the form of a bath[3], and in this state it produces a slight excitement of the skin, a peculiar taste in the mouth, and, in other respects, nearly the same effect as when it is taken internally; but the chief perceptible effect of the mixed acid is on the bowels, which it keeps moderately open. Diluted nitric acid (*Aquafortis*) has often been employed as a poison. It is detected by the orange-coloured spots which are observed on the lips, chin, and hands of the patients; and, if death be the result, by the same colour being found in a large portion of the alimentary canal, the mucous membrane of which is converted into a fatty substance, and the stomach often perforated. If any of the fluid can be obtained, the extrication of orange-coloured fumes on boiling it over copper filings, is a test of the presence of aquafortis. A good test also is a solution of indigo in sulphuric acid added to the suspected acid, until a perceptible blue is communicated. A drop of sulphuric acid is then to be added, and the mixture heated to ebullition. If the colour disappear, nitric acid is present. Soap and calcined magnesia, suspended in water, are the best antidotes.

The dose of the diluted acid is from ♏x. to ♏xxx. in f ℥iij. of water, given three or four times a day. When used as a bath, the mixed acid should be added to the water, until it

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[1] *Pearson on Remedies for Lues Venerea,* 188.

[2] Blood drawn from the arm, after the daily use of this acid for some weeks, exhibits the buffy coat.

[3] The proportions are two parts of hydrochloric acid and one of nitric, so diluted with water as to taste as sour as vinegar. Experience has not justified the high encomiums bestowed upon them.

is about as sour as weak vinegar. Nitric acid, even when diluted, is incompatible in prescriptions with oxides, earths, alkalies, and the sulphurets, also the acetates of potassa and of lead. It decomposes the two last-named salts, and forms nitrates of lead and of potassa.

Officinal preparations. — *Bismuthi Trisnitras,* L. *Hydrargyri Acetas,* D. E.

ACIDUM NITRO-MURIATICUM. Dub. *Nitro-muriatic Acid.*

" Take of nitric acid, by *measure,* one part; muriatic acid, by *measure,* two parts. Mix them together in a vessel kept cool, and preserve the mixture in a cool obscure place."

Syn. Acide hydro-chloro-nitrique: Eau régale (*F.*).

This mixed acid exhales the odour of chlorine: it is of a golden-yellow colour, and has the property of dissolving gold and platina. On heating the mixture the colour deepens, and both chlorine and nitrous acid vapours are evolved. If the heat be long continued, the chlorine ceases to be given off, the mixture no longer acts as a solvent of gold, and is in fact a mixture of nitrous and hydrochloric acids. It is probable that at first both acids are partially decomposed, water and nitrous acid formed, and chlorine is evolved.

Medical properties and uses. — This mixed acid, when properly diluted, exerts a tonic and stimulant influence on the habit. It is, however, chiefly used in the form of a foot bath in hepatic affections; and in deficient secretion of bile. The best proportions for this bath are f. ℥ ij. of the mixed acid for each gallon of water. It produces a tingling sensation on the skin; and, augmenting the flow of the bile, it operates as a mild purgative on the bowels.

When taken internally, in an overdose, this acid acts as a virulent poison; exciting violent inflammation, and corroding the coats of the stomach. Its effects are most successfully counteracted by magnesia, albumen, and milk.

ACIDUM OXALICUM. *Oxalic Acid.*

Oxalic acid exists, ready formed, in many vegetable and in some animal bodies. Combined with potassa, it is found in the leaves of Oxalis *acetosella* and *corniculata,* Rumex *acetosa,* and Geranium *acidum;* and with lime, in the roots of Rhubarb, Valerian, several lichens, and of many other plants. Berthollet procured it from honey, hair, tendons, albumen, and some other animal matters; but that which is found in the shops, manufactured for the purposes of art, is produced artificially by the action of nitric acid on sugar. The following process, which was first described by Bergman, is still adopted for the production of oxalic acid.

Into a tubulated retort, put one ounce of white sugar, and pour over it three ounces of strong nitric acid of sp. gr. 1·567. When the whole is dissolved, boil the liquor until it cease to afford nitrous fumes, and acquire a reddish-brown colour; then add three ounces more of nitric acid, and continue the boiling until the fumes cease, and the colour of the fluid disappear. Empty the contents of the retort into a wide vessel, and, upon cooling, a crystallisation will take place, which is *oxalic acid.* On boiling the lixivium with two ounces of nitric acid in the retort, until the red fumes almost disappear, a second supply of crystals will be obtained. One hundred grains of sugar, when properly treated, yield fifty-eight grains of crystallised oxalic acid. The *rationale* of the process is very obvious; the nitric acid is partially decomposed, and yields up a portion of its oxygen, which is one of its components, to the sugar, which is a compound of oxygen, carbon, and hydrogen; and, by this addition of oxygen, the carbon is converted into oxalic acid, and the hydrogen is wholly carried off in the form of water. The relative proportion of these components of sugar, is oxygen 49·4, carbon 44·5, and hydrogen 6·1, in 100 parts; that of oxalic acid, oxygen 66·6, carbon 33·3, in 100 parts, or two proportions of carbon = 12·24 + 3 of oxygen = 24, making the equivalent 36·24; but the crystals contain three equivalents of water = 27, so that the equivalent of the crystallised acid is 63·24.

The crystals should be purified by repeated solution in distilled water and recrystallisation.

Qualities. — The crystals of oxalic acid, when they are properly prepared, are flat four-sided prisms, with the sides alternately larger. They are white, transparent, inodorous, have a very acrid, sour taste, and redden all the vegetable blues except indigo. One grain of oxalic acid communicates a sensible acidity to 2633 grains of water. The crystals dissolve in twice their weight of water at 65°, and in less than their own weight of boiling water. Alcohol at a mean temperature dissolves 40 parts of them, and boiling alcohol 56 parts. They are sparingly soluble in ether. The crystals are in the state of a hydrate, 100 grains containing 58 only of acid, and 42 of water.

Oxalic acid combines with alkalies, earths, and metallic oxides, forming oxalates. Hydrochloric and acetic acids dissolve it without alteration; but it is decomposed both by sulphuric and nitric acids aided by heat. It is readily distinguished by its affording a white precipitate with lime water, or the salts of lime, which is insoluble in an excess of the acid.

Medical properties and uses. — Oxalic acid, in *small* doses, when it is dissolved in a very large quantity of water sweetened with sugar, forms an agreeable cooling beverage, which may be used in febrile diseases, in the same manner and with the same intention as lemonade. It may also be employed to check an external hæmorrhagy, which it appears to do by charring the blood as it issues from the wound, and thereby mechanically stopping its flow. It is a virulent poison when swallowed in large doses; and from the resemblance of its crystals to those of sulphate of magnesia, many fatal accidents have occurred from mistaking oxalic acid for that purgative salt. The acid taste of the salt and the bitter of the acid would always prevent such accidents, were individuals to taste their medicines before swallowing them: but besides the occurrence of accidents, oxalic acid has been too frequently employed by the wretched suicide for the purposes of self-destruction. It is, therefore, important, that every medical practitioner should be acquainted with the qualities of oxalic acid, its effects on the animal economy, and the means of counteracting these, when it has been taken in a sufficient dose to operate as a poison.

The exact extent of the dose of oxalic acid which may be taken with impunity has not been determined; but its poisonous properties are more or less virulent according to the degree of dilution of the dose. From some experiments on animals, which I made ten years since, and the published details of the appearances in dissection of several fatal cases of poisoning by oxalic acid, I was led to form an opinion that "the primary morbid action of this poison is on the stomach itself, on the coats of which its chymical action occasions the organized animal solid to enter into new combinations, and thence produces a decomposition both of the acid and the part to which it is applied:" that the acid, however, also enters into the circulation by absorption; but "that the proximate cause of death from oxalic acid is the suspension of the functions of the heart and brain, which are sympathetically affected by the local injury done to the stomach."[1] The subject has been, since then, investigated with much care and great ingenuity by Dr. Christison and Dr. Coindet, and their observations published in the Edinburgh Medical Journal.[2] From the labours of these gentlemen, I am induced to change my opinion as to the extent of the injury done to the living stomach, and to believe that the pultaceous state of that organ, which was found by me in my

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[1] *London Med. Repos.* vol. iii. p. 386.
[2] See *Edin. Med. and Surg. Journ.* vol. xix. p. 163.

experiments on dogs, is to be attributed to the action of the acid on its coats after death. I am, however, still of opinion, that death is less to be attributed to the sedative power of the poison acting on the brain and spine, to which it is carried by absorption, than to the sympathetic action on the nervous system from the local injury of the stomach; an opinion according with their first conclusions, that "oxalic acid, when introduced into the stomach in large doses, and highly concentrated, irritates it, or corrodes it by dissolving the gelatin of its coats; and death takes place by a sympathetic injury of the nervous system."[1]

The general symptoms attending poisoning by oxalic acid are burning pain in the stomach, violent and incessant vomiting, the matter ejected being commonly dark-coloured and sometimes bloody; in some cases there have been violent gripings and purging; the pulse soon sinks and becomes almost imperceptible; and this state is followed by deadly coldness of the limbs, attended with lividity of the fingers and nails, and clammy sweats: convulsions, but not in every instance, and insensibility, precede death. With regard to the appearances after death, no particular change in the external state of the body has been noted. On opening the body, the *stomach* is found, generally, to contain a quantity of dark-coloured fluid, which is probably extravasated blood charred by the poison; in some instances, the coats of the stomach have been found greatly injured, presenting appearances of great vascularity, thickening of the mucous coat, the rugæ pultaceous and easily wiped off, and, in some cases, the other membranes have been found tender, and even perforated, so that the contents of the organ have escaped into the cavity of the abdomen. The lungs and heart have not been often examined; but in the lower animals killed by oxalic acid, both have presented indications of inflammation having existed in them, particularly the lungs. The vessels of the brain have been found turgid.

The fatal effects of poisoning by oxalic acid are so rapid, that little opportunity is afforded for counteracting them by medical art. The first object certainly, in every case, is to evacuate the poison from the stomach, and when the stomach-pump is at hand, it should be instantly employed. The vomiting which usually supervenes precludes the necessity of employing emetics; and copious dilution, which in other cases of corrosive poison is advisable, is more likely to promote the absorption of the acid, and, consequently, increase

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1 Toland, p. 185.

its powers. Before, therefore, emetics are employed, if they should be deemed necessary, the activity of the poison should be weakened by altering its nature by some substance with which, in chymically combining, its solubility is diminished. That chalk produces this effect, I discovered in making the experiments already alluded to: and many instances have since occurred in which its administration has saved the lives of individuals poisoned by oxalic acid. The lime of the chalk unites with the oxalic acid, and forms an oxalate, which is perfectly inert. Magnesia may be employed instead of chalk, and it has the advantage of not inconveniencing the patient by the extrication of carbonic acid gas, which is copiously evolved when the chalk unites with the acid; but, as the oxalate of lime is more insoluble than the oxalate of magnesia, and, consequently, more inert, it may be questioned whether the inconvenience of the gas be equivalent to the greater security from the employment of chalk. A mixture of chalk and water, or of magnesia and water, should, therefore, be instantly given when oxalic acid has been taken in a large dose; and, after the local effects of the poison have been counteracted, the system should be supported by cordials combined with opium, and the oxalate afterwards carried out of the system by the aid of purgatives.

To obtain legal evidence in cases of poisoning by oxalic acid, when none of the poison is found, we may be guided to suspect the nature of the poison by the symptoms and the post-mortem appearances; but a correct opinion can be formed only by an analysis of the vomited matter, the contents of the stomach and its coats. For this purpose the vomited matter and the contents of the stomach should be separately diluted with distilled water, and the coats of the organ itself boiled in distilled water. These solutions should then be separately filtered and decolorized with chlorine, and subjected to the following tests. If oxalic acid be present, hydrochlorate of lime will occasion a precipitate which is soluble in a small quantity of nitric acid, but not in hydrochloric, unless a very large quantity of the acid be used. Sulphate of copper throws down a bluish white precipitate in any fluid containing free oxalic acid, which is insoluble in hydrochloric acid; and nitrate of silver occasions a heavy white precipitate, which, when dried and heated over the flame of a candle on the point of a spatula, becomes brown at the edge, then suddenly fulminates, and is all dissipated in white fumes. This is a very delicate test; for Dr. Christison informs us that, from a quarter of a grain of oxalic acid dissolved in 4000 parts of water, he and Dr. Coindet procured enough of the oxalate of silver to show its fulmination twice.[1]

ACIDUM SUCCINICUM, Edin. *Succinic Acid.*

"Take of amber in powder, and pure sand, *equal parts;* mix, and put them into a glass retort, of which they may fill one half. Having adapted a large receiver, distil from a sand-bath, with a gradually raised fire. A watery liquor with a little yellow oil will first distil over: then a yellow oil with an acid salt; and, lastly, a reddish and black oil. Pour the liquor out of the receiver, and let the oil be separated from the water. Press the acid salt, collected in the neck of the retort and on the sides of the receiver, between folds of bibulous paper, that it may be freed from the adhering oil; then purify it by solution in hot water, and crystallization."

ACIDUM SUCCINICUM ET OLEUM SUCCINI, Dub. *Succinic Acid.*

"Take of amber coarsely powdered, and pure sand, each *a pound.* Distil, with a gradually increased heat, an acid liquor, an oil, and an acid under the form of crystals. Wrap up this salt in bibulous paper, and subject it to the press to separate the oil; then let it be again sublimed. The oil strained through the bibulous paper may be obtained separate from the acid liquor."

Syn. Acide Succinique (*F.*), Bernsteinsâure (*G.*), Acido Succinico (*I.*).

The use of the sand in these processes is to prevent the amber, which swells very much, from passing over into the receiver. The heat which is necessary for the complete decomposition of the amber is very considerable; and therefore, by following exactly the formulæ of the colleges, this is scarcely ever accomplished. The succinic acid is partly dissolved in the water which condenses in the receiver, but the greater part is sublimed in the neck of the retort, and is so much contaminated with the oil, that after repeated solution and crystallization, and even resublimation, it still retains a portion of it. According to Guyton Morveau[2], it may be obtained perfectly pure by distilling from double its weight of nitric acid, with a heat not strong enough to sublime the succinic acid, but sufficient to evaporate the solution to dryness. The oil is decomposed, and the acid remains untouched. It is then to be well washed in a little water, and crystallized by dissolving it in boiling water and evaporating.

Qualities.—The crystals of succinic acid are minute quadrilateral prisms. When pure, they are white, translucent,

[1] *Edin. Med. Journ.* vol. xix. p. 198.
[2] *Annales de Chimie,* xxix. 165.

and shining; have a slight, penetrating, sour taste; redden infusion of litmus; are unalterable in the air, volatile and inflammable, and burn away without leaving any odour. They are soluble in twenty-four parts of water at 60°, and two parts at 212°; the greater part, however, crystallizing as the water cools. They are also soluble in alcohol, and in sulphuric and nitric acid, without suffering decomposition. With the alkalies, earth, and metallic oxides, succinic acid combines and forms succinates. It is a triple compound of 47·600 parts of carbon, 4·512 of hydrogen, and 47·888 of oxygen [1]; or of 4 equivalents of carbon $=24·48+3$ of oxygen $=24+2$ of hydrogen $=2=50·48$.

This acid is often adulterated with tartaric acid, hydrochlorate of ammonia, and sulphate of potassa. The first is detected by carbonate of potassa; the second by nitrate of silver; and the sulphate by barytic water. It is altogether discarded from practice.

ACIDUM PHOSPHORICUM DILUTUM, Lond.
Diluted Phosphoric Acid.

Take of phosphorus, *one ounce;* nitric acid, *four fluid ounces;* distilled water, *ten fluid ounces.* Add the phosphorus to the nitric acid, mixed with water, in a glass retort placed in a sand-bath; then apply heat until eight fluid ounces are produced. Put these again into the retort, that eight ounces may distil, which are to be rejected. Evaporate the remaining fluid in a platina capsule until it is reduced to two ounces and six drachms. Lastly, to the acid, when it is cold, add as much distilled water as may be sufficient to make up accurately twenty-eight fluid ounces by measure.

In this process the nitric acid is decomposed by the affinity of the phosphorus for oxygen being greater than that of the nitrogen. The necessity of diluting the acid is obvious; for when phosphorus is added to strong nitric acid, rapid combustion, attended with explosion, takes place; whereas in the diluted acid the phosphorus slowly attracts the oxygen, and binoxide of nitrogen is evolved. The repetition of the process is necessary to secure the acidification of the whole of the phosphorus: but even then a minute portion of it remains unacted upon.

Qualities. — Phosphoric acid obtained according to the above process is colourless, inodorous, and has a sharp acid taste; but it does not act on animal matter, like sulphuric and nitric acids. It forms permanent salts with alkalies and metallic oxides. When evaporated to dryness, and heated to

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[1] *Annals of Philosophy,* vol. v. p. 99.

redness, it forms meta-phosphoric acid. It consists of 2 eq. of phosphorus, 31·4 + 5 of oxygen = 40, making the equivalent = 71·4. Phosphoric acid forms insoluble precipitates with lime-water and the hydrochlorate of lime; baryta, magnesia, the salts of lead, and nitrate of silver: hence these substances are incompatible in prescriptions with it.

Medical properties and uses.—Diluted phosphoric acid possesses tonic properties, and may be beneficially administered in all cases in which the mineral acids are indicated. It is also indicated in cases in which the phosphates are deposited from the urine, and in exostosis and other bony tumours. The dose is from ♏x. to ♏xx., in water or any bland fluid.

ACIDUM SULPHURICUM PURUM, Dub. *Pure Sulphuric Acid.*

"Take of common sulphuric acid, *one pound.* Put it into a white glass retort, and have fitted to it a receiver of the same description, and luted; distil over one twelfth of the quantity in the retort, and reject it as watery. Having again fitted the receiver, distil to dryness.

"It is necessary to place a portion of platina in the retort to prevent the boiling from becoming too vehement.

"The specific gravity of this acid should be to that of distilled water as 1845 to 1000.

"It must be kept in closely stopped vessels."

This operation is seldom requisite for the purposes of medicine. Sulphuric acid, except for pharmaceutical purposes, is always employed in its diluted state; and the addition of the water requisite throws down any sulphate of potassa, or of lead, which the strong acid may contain. If it be filtered, and boiled to expel the water, a very pure acid is procured. In this state it consists of 1 eq. of the anhydrous acid = 40·1 + 1 of water = 9, making the equivalent 49·1.

ACIDUM SULPHURICUM DILUTUM, Lond. *Diluted Sulphuric Acid.*

"Take of sulphuric acid *a fluid ounce and a half;* distilled water, *fourteen fluid ounces and a half.* Add the acid gradually to the water, and mix."

Edinburgh.

"Take of sulphuric acid, *one part;* water, *seven parts:* mix them."

Dublin.

"Take of pure sulphuric acid, *one part;* distilled water, *seven parts.* Add the water gradually to the acid. The specific gravity of this acid is, to that of water, as 1084 to 1000."

Syn. Acidum Vitriolicum dilutum, P. L. 1787. Acide Sulphurique étendu d'eau (*F.*), Verdüunte Schwefelsäure (*G.*), Verduuntes Zwavelzuur (*Dutch*), Acido solforico diluito (*I.*), Zakab (*Arab.*).

It is very much to be regretted, that the London College, when it altered the proportions of acid and water in this mixture, from those in the edition before the last of its Pharmacopœia, did not adopt the proportions ordered by the two other colleges, so that, in this preparation at least, a standard strength might have been fixed for the whole kingdom. The reasons which induced it to adopt the present proportions are not easy to be conceived; for the puerile reason that "this mixture will be more conveniently made, and its dose more easily apportioned than the former one," cannot surely have operated in causing the alteration. One fluid ounce of this diluted acid of the London Pharmacopœia contains 80 grains of the strong acid; in the Edinburgh and Dublin Pharmacopœias it constitutes an eighth part.

Owing to the great affinity of sulphuric acid for water, and the density of the mixture being much greater than the mean of the separated acid and water [1], a very considerable increase of temperature is produced during their combination, sufficient to crack the glass vessels in which it is made, if the two ingredients be at once mixed together. [2] To prevent such an accident, the acid must be gradually added in small portions to the whole of the water, and the mixture agitated after every addition. It is of importance always to ascertain the specific gravity of the acid before the mixture be made. The mixture, when it has cooled down to the temperature of the atmosphere, lets fall a white precipitate, consisting of a small portion of sulphate of lead, which the strong acid always contains, but which the diluted acid is incapable of holding in solution. The diluted acid is thus purer than the strong acid, which suffers no other alteration except in point of strength. If it be suspected to contain sulphate of potassa, this may be detected by saturating a given quantity of the acid with ammonia, then evaporating to dryness, and afterwards expelling the sulphate of ammonia by heat: the sulphate of potassa will be left behind.

Medical properties and uses. — Diluted sulphuric acid is tonic, antiseptic, and refrigerant. Its tonic and antiseptic

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1. It is a curious fact that, after the mixture has cooled down to the temperature of the atmosphere, a considerable time elapses before it acquires its real density.

2 If one part by weight of sulphuric acid of 1·845 specific gravity be mixed with one fourth its weight of water, both being at the temperature of 50° Fahr., the caloric instantly evolved is sufficient to raise the thermometer from 50° to 300°, and a still greater heat is produced by mixing 73 parts of the acid with 27 of water.

powers render it extremely serviceable in low typhoid fevers, dyspeptic affections, diabetes, convalescences, and in cutaneous eruptions. It restrains the colliquative sweats which attend hectic: locally applied, it is a common and useful adjunct to gargles in cynanche, and to check salivation; and as a refrigerant it is given with certain benefit in passive hæmorrhages, from whatever part they may arise. Combined with mucilages, it has been beneficially given in passive diarrhœas, operating on the relaxed mucous coat of the intestine as an astringent. In the first-mentioned cases, the diluted acid may be combined with infusions of cinchona or other vegetable bitters and aromatics; and in the latter with infusion of roses, mucilage, or simple water sweetened with syrup. It is certainly injurious to the teeth; and, therefore, should be sucked through a quill, when taken as an internal remedy. The usual dose is from ♏ x. to ♏ xxx., but this dose may be very often repeated: in malignant erysipelas, with a tendency to hæmorrhage, it has been given to the amount of f ℥ j. in twenty-four hours; and we have administered it, with evident advantage, to the same amount, in violent uterine hæmorrages, and in obstinate scabies.

Officinal preparations.—*Acidum Sulphuricum aromaticum,* E. *Infusum Rosæ compositum,* L. *Potassæ Bisulphas,* L. D. *Sodæ Sulphas,* L. E. D. *Ferri Sulphas,* L. E. D. *Zinci Sulphas,* L. E. D.

ACIDUM SULPHURICUM AROMATICUM, Edin. Dub. *Aromatic Sulphuric Acid.*

"Take of alcohol, *two pounds;* sulphuric acid, *six ounces.* Drop the acid gradually into the alcohol. Digest the mixture in a covered vessel with a very gentle heat for three days; then add of cinnamon bark, bruised, *one ounce and a half;* ginger root, bruised, *one ounce.* Digest again in a closed vessel for six days; then filter through paper placed in a glass funnel."

This preparation is generally regarded as an imperfect ether; but we are of opinion that the reciprocal action of the acid and alcohol during the digestion is scarcely sufficient to produce such a result; and the acid, undoubtedly, very much predominates. It is, therefore, a simple alcoholic solution of sulphuric acid, holding the essential oils of cinnamon and of ginger in solution.

Qualities.—The odour is peculiar and aromatic; the taste gratefully acid. It is limpid, and of a brownish colour.

Medical properties and uses.—This is an agreeable mode of exhibiting sulphuric acid in dyspepsia, chronic asthma, and most of the complaints for which the diluted acid has been found serviceable. The dose is from ♏ x. to ♏ xxx., in any convenient fluid vehicle; and may be given three or four times a day.

ACIDUM TARTARICUM, Lond. *Tartaric Acid.*

"Take of bitartrate of potassa, *four pounds;* boiling distilled water, *two gallons and a half;* prepared chalk, *twenty-five ounces and six drachms;* diluted sulphuric acid, *seven pints and seventeen fluid ounces;* hydrochloric acid, *twenty-six fluid ounces and a half; or as much as may be sufficient.* Boil the bitartrate of potassa with two gallons of the distilled water, and gradually add half the prepared chalk, and when the effervescence has ceased, add the remainder of the chalk dissolved in the hydrochloric acid with four pints of distilled water: set the mixture apart, that the tartrate of lime may subside; pour off the fluid, and wash repeatedly the tartrate of lime with distilled water, until it come off tasteless. Then pour upon it the diluted sulphuric acid, and boil for a quarter of an hour. Filter the liquor, and evaporate it in a water-bath, to obtain the crystals." Dissolve the crystals again, and a third time in water that they may be pure, and strain the solution as often; boil it down and set it aside.

Dublin.

"Take of bitartrate of potassa rubbed into powder, *ten parts;* prepared chalk, *four parts;* sulphuric acid, *seven parts;* water, *one hundred and twenty parts.* Mix the bitartrate of potassa with one hundred parts of the water at a boiling temperature; gradually add the chalk; and when the effervescence is over, pour off the limpid supernatant liquid. Wash the residue, which is tartrate of lime, until it is tasteless. Pour into the decanted liquor as much solution of muriate of lime as will precipitate the tartrate of lime it may hold suspended, and having washed this also with water until it becomes tasteless, mix it with the prior precipitate. Then add the sulphuric acid diluted with the twenty parts of water, and digest the mixture in a medium heat for three days, frequently stirring. The liquors, as well the acid liquor as that employed for washing, evaporate, by a moderate heat, to crystallization. Purify the crystals by repeated solutions and crystallizations, and keep them in a closely-stopped glass bottle."

In these processes, which are nearly the same as that of Scheele, the lime of the chalk separates the excess of tartaric acid from the potassa with which it was previously combined [1]; and again yields it up, in order to combine with the sulphuric acid, which is used in the second part of the process. The

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[1] The components of bitartrate of potassa are, tartaric acid 70·15, potassa 25·13, and water 4·72, in 100 parts.

use of the hydrochloric acid is to form with the chalk a chloride of lime, which decomposed the tartrate of potassa, so that the whole of the tartaric acid is thus procured. Before crystallizing, it is proper to test the liquor by dropping a little acetate of baryta into a small portion of it, which throws down a precipitate insoluble in nitric acid, if any sulphuric acid be present; in which case a little more tartrate of lime should be added. The crystals are obtained in groups, and cannot be always procured of the same form under the most careful management. The process is not adapted for operations on a small scale, and indeed may be regarded as an incumbrance of the Pharmacopœia, as much better tartaric acid can be purchased at a moderate price, prepared in the large way.

Qualities. — Tartaric acid in its crystallized state is white, imperfectly transparent, persistent in the air, inodorous, and very acid to the taste. The primary form of its crystal is an oblique rhombic prism.[1] It melts when heated a little above 212°, and boils at 250°, without losing its whiteness, and unless the boiling be long continued, it loses little more than 4 *per cent.* of its weight: but the nature of the acid is changed; for on cooling, the semi-transparent mass into which it concretes is deliquescent. Tartaric acid is readily soluble in water, which dissolves one fifth of its weight, at 60° Fah. and twice its weight at 212°; and the saturated solution is not soon liable to spontaneous decomposition. It is, also, partially soluble in alcohol. It is decomposed by a high temperature, and also by sulphuric and nitric acids, the latter of which converts it into oxalic acid. It combines with alkalies, earths, and metallic oxides, forming *tartrates;* and in its power of saturating alkalies closely resembles citric acid. According to the analysis of Berzelius, 100 parts of this acid, as it exists in tartrate of potassa, are composed of 3·951 of hydrogen, 36·167 of carbon, and 59·882 of oxygen, or of five equivalents of oxygen = 40 + 4 of carbon = 24·48 + 2 of hydrogen = 2, making the equivalent 66·48: but, in its ordinary crystallized state, or as a hydrate, it is composed of 88·16 parts of real acid, and 11·84 of water, in 100 parts, or of one eq. of dry acid = 66·48 + 1 of water = 9 equiv. = 75·48. When carelessly made, it may contain sulphuric acid, which, however, can be detected by adding chloride of barium to a weak solution, when a precipitate insoluble in an excess of nitric acid will be thrown down, if sulphuric acid be present. One hundred grains of the crystallized acid saturate 200 grains of crystallized carbonate of soda.

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[1] *Phillips's Trans. of Pharm.* 1824.

Medical properties and uses.— Tartaric acid, largely diluted and sweetened, forms a cooling agreeable beverage in fevers and diseases connected with an increased secretion of bile. It is incompatible in prescriptions with solutions of salts containing potassa, which it converts into a bitartrate, which being of difficult solution is thrown down in minute crystals. It also precipitates salts of lime and of lead. Dissolved in water, and added to an aqueous solution of carbonate of soda, it forms a good substitute for soda-water.

Officinal preparations. — *Potassæ Tartras*, L. E. D. *Sodæ Potassio-tartras*, L. *Antimonii Potassio-tartras*, L. E. D. *Ferri Potassio-tartras*, L. E. D.

ÆTHEREA.

PREPARATIONS OF ÆTHER.

THE action of the strong acids on alcohol aided by heat, produces an order of compounds which possess both important chymical properties and medicinal virtues. These are named ÆTHERS, and agree in certain general properties, but vary in some of their qualities, and in their formation, according as they are produced from different acids; and they are distinguished by the name of the acid with which they are prepared. They are all extremely volatile, and require to be preserved in closely stopped phials.[1] The following are medicinally used.

ÆTHER SULPHURICUS, Lond. *Sulphuric Æther.*

"Take of rectified spirit, *three pounds*; sulphuric acid, *two pounds; carbonate of potassa, previously ignited, one ounce.* Pour *two pounds* of the spirit into a glass retort, and having added the acid, mix. Then place it on a sand-bath, so that the liquor may boil as quickly as possible, and the æther pass into a receiver, kept cool by ice or water. Let the liquor distil until a heavier fluid begin to pass over. Having lowered the heat, pour the remainder of the spirit on the liquor, which remains in the retort, that æther may distil as before. Mix the distilled liquors together, then pour off the supernatant portion, and add to it the carbonate of potassa, agitating occasionally

1 The phial proposed by Dr. Dewar is the best for this purpose. It consists of a stopped phial, having a circular rim round its shoulder, not rising quite so high as the mouth of the bottle, and a glass cup with a heavy bottom, which, when inverted over the mouth of the phial, and mercury poured into the rim, hermetically closes it. *Annals of Phil.* vol. x. p. 20.

for an hour. Finally, distil the æther from a large retort, and keep it in a closely-stopped bottle.

Edinburgh.

"Take of sulphuric acid, alcohol, of each *thirty-two ounces.* Pour the alcohol into a glass retort, capable of sustaining a sudden heat; then pour the acid on it in an uninterrupted stream. Mix them gradually by frequent and gentle agitation: then immediately distil from a sand-bath, previously heated for the purpose, into a receiver kept cold with water or snow. Let the fire be so regulated that the fluid may boil as soon as possible, and continue to boil until sixteen ounces shall have distilled over; then let the retort be removed from the sand-bath.

"To the distilled liquor, add *two drachms* of potassa; then distil again from a high retort, with a very gentle heat, into a receiver kept cold, until ten ounces have passed over.

"If *sixteen ounces* of alcohol be added to the residuary acid after the first distillation, and the distillation repeated, æther will be reproduced. And this may be often repeated."

LIQUOR ÆTHEREUS SULPHURICUS, Dub. *Sulphuric Æthereal Liquor.*

"Take of rectified spirit, sulphuric acid, each *thirty-two ounces, by weight.* Pour the spirit into a glass retort, fit to bear a sudden heat, and over it the acid in a continued stream. Mix, and distil into a cold receiver *twenty ounces,* by measure, of the liquor, by the aid of a suddenly raised strong heat.

"To the residue in the retort add *sixteen ounces* of rectified spirit, and by distilling again, more æthereal liquor will be produced."

ÆTHER SULPHURICUS, Dub. *Sulphuric Æther.*

"Take of sulphuric æthereal liquor, *twenty fluid ounces;* subcarbonate of potassa, dried and in powder, *two drachms.* Mix them, and distil from a high retort by means of a very gentle heat, into a receiver kept cold, twelve fluid ounces. The specific gravity of this fluid is to that of distilled water as 765 to 1000."

Syn. Ether (*F.*), Schwefeläther (*G.*), Etere (*I.*).

The admixture of alcohol and sulphuric acid produces an almost instantaneous formation of æther, which is made sensible by the odour of the mixture; while by the mutual action of the spirit and the acid on each other a considerable evolution of caloric takes place, and the temperature of the mixture is raised to 180°. Whatever can encourage the sudden rise of temperature, and the disengagement of æthereal vapours before the apparatus be adjusted, should be avoided; for not only is the retort in danger of being broken, but a considerable waste of product also takes place. The retort should be thin, and the sand-bath previously heated to more than 200°; for unless the liquor boil immediately alcohol only is given over: as soon as boiling commences the æther is formed, and distils over. The æther, as it distils, is condensed in the cool receiver, in the form of a colourless, limpid, transparent fluid; but towards the end of the operation, a white vapour also comes over, on the appearance of which the distillation should be stopped, or the receiver changed. The receiver ought to be ample, and kept cool with ice or snow, or cold water, which we have found to be preferable to ice or snow. The best mode of applying it is to lay narrow shreds of woollen cloth over the receivers, with one end of each immersed in a vessel of cold water placed higher than the receiver, by which means the water is made to trickle constantly over it; and by the evaporation the receiver is kept in a sufficiently low temperature, and at the same time the nature of its contents is distinctly seen, which cannot be conveniently done when they are immersed in snow, or ice, or even in water. The luting, which answers best in this operation, is common paste, spread on slips of calico, which are to be first applied, and when dry surrounded with pieces of wet bladder.

The product of the first distillation is sulphuric æther combined with water, alcohol, and a small portion of sulphurous acid, forming an impure æther of the specific gravity ·768; and that of the second distillation, or that obtained after the addition of a new portion of alcohol, is a similar æther of the specific gravity ·807: on mixing these, a fluid of the specific gravity ·788 is obtained, which is unrectified æther. By the rectification of this æther according to the directions of the British Colleges, it is deprived of the sulphurous acid and nearly of all the water, and its specific gravity is reduced to ·732, or, when highly rectified, to ·725; but it still contains some water and alcohol, as æther of a specific gravity so low as ·632 in the temperature of 60° is said to have been obtained.[1] The use of the alkali in the rectification is to separate and detain the acid and the water by its affinity for these substances; and this is still more completely accomplished by the addition of a portion of black oxide of manganese, which, by affording oxygen to the sulphurous acid, converts it into

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[1] Lowitz procured æther of this gravity by the following process. To æther reduced to ·746 specific gravity by means of carbonate of potassa in the usual method he added as much dry powdered chloride of lime as it would dissolve. On standing, the mixture separated into two parts; the alcohol holding the salt in solution sunk to the bottom: the æther swam on the surface. When separated from the inferior liquor, its specific gravity was now only ·632 in the temperature of 60°. *Thomson's Chymistry*, 4th ed. ii. 443.

sulphuric acid, and thus renders it perfectly fixed at the temperature employed.

The theory of the formation of æther is still unsettled. It has been contended, that the balance of affinities between the constituents of the alcohol is broken by the acid, the oxygen of which attracting a portion of the hydrogen of the alcohol forms water; while a portion of its carbon, at the same time set free, forms the residuary black matter found in the retort; and, by a new combination of the remaining hydrogen, carbon, and oxygen, the æther is produced. This explanation, however, which supposes a partial decomposition of the acid, has been denied by Fourcroy and Vauquelin, who, from a series of very ingenious experiments[1], concluded, that the acid suffers no decomposition, except towards the end of the process, which is to be attributed to the carbonaceous matter collected in the retort; but that it produces the decomposition of the alcohol without being itself decomposed, by the exertion alone of a disposing affinity, abstracting water or its elements from the alcohol. The æther, according to them, is the result of the new combination of the components of the alcohol, part of its oxygen and hydrogen first combining to form water, and a large portion of its carbon being separated without entering into any new combination; so that æther differs from alcohol only in containing a greater proportion of hydrogen and oxygen, and a smaller proportion of carbon. Thus, alcohol, according to the analysis of Saussure, is a compound of carbon 52·17, oxygen 34·79, and hydrogen 13·04 in 100 parts; or of one equivalent of etherine $= 28{\cdot}48 + 2$ of water $= 18 = 46{\cdot}48$: whilst æther consists of carbon 67·98, oxygen 17·62, and hydrogen 14·40: or of one equivalent of etherine $= 28 + 1$ equivalent of water $= 9 = 37{\cdot}48$: or alcohol consists of 2 atoms of carbon $= 12{\cdot}24 + 1$ atom of oxygen $= 8, + 3$ atoms of hydrogen $= 3$, making the equivalent $= 23{\cdot}24$; whilst æther consists of 4 eq. of carbon $= 24{\cdot}48 + 5$ of hydrogen $= 5 + 1$ of oxygen, making the equivalent $= 37{\cdot}48$; or it is a hydrate of etherine. Mr. Hennel found that two equivalents of sulphuric acid being added to two of alcohol, the acid undergoes great changes, and is converted into sulphovinic acid, which is a compound of sulphuric acid and a carburet of hydrogen; and he supposes that it is a stage in the formation of this ether. It is present in greatest quantity when the materials are first mixed; but as the distillation proceeds and the æther is formed, the sulphovinic acid diminishes in quantity, until it entirely disappears. (See *Journ. of Science*, vol. xxi. p. 331.) The sulphurous and carbonic

[1] *Annales de Chimie*, xxiii. 203.

acids, and the charry residue formed in the process, are produced by the decomposition of a portion of the alcohol by the sulphuric acid, which is set free at the end of the process. Berzelius regards æther as a compound of ethule, a substance consisting of 4 eq. of carbon + 1 of hydrogen, and the addition of 1 eq. of oxygen forms æther; or in other words, that æther is a protoxide of ethule.

Qualities.— Æther has a fragrant, penetrating odour, and a hot, pungent taste. It is colourless and perfectly limpid; and is the most volatile of liquids, drying immediately if poured on the hand, and producing a great degree of cold by its evaporation. Its sp. gr. is from 0·750 to 0·632 when perfectly pure: but it is seldom procured in the shops under 0·733. When it is of a density 0·720 it boils in the open air at 96°, and in vacuo at 20°, a temperature 12 degrees below the common freezing point; and, but for the pressure of the atmosphere, it would always be in a gaseous form. When cooled down to 46° below zero of Fahr., æther congeals in brilliant transparent plates. It is extremely inflammable, taking fire on the approach of an ignited body; a circumstance which requires to be attended to in pouring it from the phial to a glass by candle-light. During its combustion, water and carbonic acid are formed, and traces of charcoal are left behind. It unites with alcohol in every proportion, and also readily mixes with ammonia; but ten parts of water take up or dissolve one only of æther. It dissolves balsams, wax, volatile oils, bitumens, camphor, extractive, gum-resins, resins, sulphur in small proportions, narcotina and bichloride of mercury, but it does not dissolve the fixed alkalies. It is decomposed by sulphuric acid, which converts it into sweet oil of wine.[1] Æther is sometimes adulterated: if it contain sulphuric acid from imperfect rectification, this may be detected by a precipitate being formed on the addition of solution of baryta; when *alcohol* is present, a milky solution is formed with phosphorus, which is not the case when it is pure. It should be kept in an obscure place, for, when exposed to light, in a bottle partially filled, it absorbs oxygen, and acetic acid is generated.

Medical properties and uses.— Sulphuric æther is stimulant, narcotic, and antispasmodic. In large doses its operation resembles alcohol, but it is more diffusable, and its effects are less permanent. It is beneficially employed as a cordial in typhoid and low fevers, particularly when nausea, subsultus

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[1] When *sulphuric* and *hydrochloric æthers* are mixed together in equal proportions, the evaporation is very rapid, and a degree of cold considerably below 0 of Fahrenheit is produced.

tendinum, and other spasmodic symptoms are present. As an antispasmodic, it relieves the paroxysm of spasmodic asthma, whether it be taken into the stomach, or its vapour only be inhaled into the lungs; in which latter form it is also useful in simple dyspnœa and in catarrh. Much caution, however, is required in inhaling the vapour of æther, as the imprudent inspiration of it has produced lethargic and apoplectic symptoms. It is employed with advantage in hysteria, tetanus, cramp of the stomach, hiccough, and in cholera morbus, to check the vomiting; and it also allays the violence of sea-sickness. The usual dose of sulphuric æther is from ♏xx. to f℥j.; but it has been given in much larger doses with the most beneficial effects: and in all cases the dose must be repeated at short intervals to produce the full effect of the remedy. As an external application, æther acts either as a stimulant or a refrigerant, according to the mode in which it is applied. The first occurs when it is prevented from evaporating, by being confined over the spot to which it is applied: in which case it often proves useful in relieving headache and other muscular pains: the second, its refrigerant effect, is produced by its rapid evaporation, on which account it is applied to burns, and to assist in the reduction of strangulated hernia. We have seen it produce almost immediate relief in earache, when dropped into the external meatus.

Officinal preparation. — *Spiritus Ætheris Sulphurici comp. L.*

OLEUM ÆTHEREUM[1], Lond. *Æthereal Oil.*

"Take of rectified spirit, *two pounds;* sulphuric acid, *four pounds;* distil again the solution of potassa, and distilled water, of each *a fluid ounce*, or as much as may suffice. Mix the acid and the spirit cautiously together. Let the liquor distil until a black froth swells up: then immediately remove the retort from the fire. Separate the lighter liquor from the heavier; and expose the former to the air for a day. Add to it the solution of potassa mixed with water, and shake them together. When sufficiently washed, separate the æthereal oil which subsides. Lastly, take off the æthereal oil after it has separated."

LIQUOR ETHEREUS OLEOSUS, Dub. *Oily Æthereal Liquor.*
"Take what remains in the retort after the distillation of sulphuric æther. Distil to one half, by a moderate heat."

Syn. Huile douce de vin (*F.*), Oleo dolce di vino (*I.*).

The product of both these processes is a thick oily matter, of a yellow colour, slightly viscid; of sp. gr. 1·05, less volatile than æther, soluble both in æther and alcohol; but insoluble

[1] Oleum vini, P. L. 1787.

in water. It is supposed to be a perfectly neutral compound of carburet of hydrogen and sulphuric acid; it consists of 1 eq. of sulphuric acid = 40 + 9 of carbon = 55·8 + 9 of hydrogen = 9; making the equivalent 104·9. After being kept for a few months, æthereal oil becomes viscid, and prismatic crystals form in it, which are soluble in æther and alcohol, melt at a slight heat, and sublime unaltered. In sulphuric acid they dissolve, forming a pink solution; and in nitric a deep red: but they are insoluble in hydrochloric and acetic acids and in the alkalies. It can be obtained more directly, although less economically, by distilling æther with a portion of sulphuric acid. It is used only for the preparation of the compound spirit.

Officinal preparation. — *Spiritus Ætheris Sulphurici compositus*, L. D.

ÆTHER SULPHURICUS CUM ALCOHOLE AROMATICUS, Edin. *Aromatic Sulphuric Æther with Alcohol.*

"Take of cinnamon bark, bruised, cardamom seeds, bruised, each *an ounce;* long pepper, bruised, *two drachms;* sulphuric æther with alcohol, *two pounds and a half.* Digest for seven days, and filter through paper."

This preparation does not differ in its medicinal properties from the former; the aromatics rendering them only a little more grateful.

SPIRITUS ÆTHERIS NITRICI[1], Lond. *Spirit of Nitric Æther.*

"Take of rectified spirit, *three pounds;* nitric acid *four ounces.* Add the acid gradually to the spirit, and mix; then distil thirty-two fluid ounces."

SPIRITUS ÆTHERIS NITROSI, Edin. *Spirit of Nitrous Æther.*

"Take of alcohol, *three pounds;* nitrous acid, *one pound;* pour the alcohol into a large phial placed in a vessel full of cold water, and add the acid gradually, with frequent agitation. Let the phial be slightly corked and placed in a cool place for seven days: then distil the liquor by the heat of boiling water, into a receiver kept cool with snow or water, as long as any spirit comes over."

SPIRITUS ÆTHEREUS NITROSUS, Dub. *Nitrous Æthereal Spirit.*

"Add to the matter which remains after the distillation of nitrous æther the rectified spirit of wine employed in that operation for condensing the elastic vapour, and distil to

[1] Spiritus nitri dulcis, P. L. 1745. Spir. ætheris nitrosi, 1787.

dryness with the greater heat of a water bath. Mix the distilled liquor with the alkaline liquor which remains after the separation of the nitrous æther, and also add as much dry subcarbonate of kali as shall be sufficient to saturate the predominant acid; which is to be determined by the test of litmus. Lastly, distil by the medium heat of a water bath, as long as any fluid comes over. The specific gravity of this liquor is to that of distilled water, as ·850 to 1000."

Syn. Alcohol éthéreux par l'acide nitrique (*F.*), Atherischer saltpeter spiritus (*G.*), Spirito di nitro dolce (*I.*).

The products of the London and Edinburgh processes are in every respect the same; but the former is to be preferred on account of the length of time required by the latter. The small quantity of acid in proportion to the alcohol employed permits the mixture to be effected without any violent action taking place, or the evolution of much heat, provided the acid be added in small quantities, and at intervals, and each portion be thoroughly mixed with the alcohol before another be added. The heat employed for the distillation should not exceed 212°, and it should be stopped as soon as thirty-two fluid ounces come over; for when it is longer continued, the product becomes coloured, and contains too much free acid.[1] The theory of the operation, inasmuch as relates to the production of the nitric æther, which is thus obtained in combination with a large proportion of unchanged alcohol and a small proportion of nitric acid, is nearly the same as that already detailed; except that a partial decomposition of both the alcohol and the acid takes place. The entire product has the same relation to nitric æther as spirit of sulphuric æther has to sulphuric æther.

The product obtained by the first part of the Dublin process is analogous to the above. The acid which the residue of the distillation of nitrous æther contains, and the alcohol already impregnated with a small portion of that fluid, when mixed and heated, act reciprocally on each other, and a compound of nitric æther, unchanged alcohol, and free acid, distils over; but the alkali with which it is mixed before the second distillation removing the acid, its properties, both as a chymical compound and as a remedy, must be necessarily altered. The products of the former processes are those which have been longest known and most extensively employed.

Qualities. — Spirit of nitric æther, as procured by the London or the Edinburgh process, has an extremely fragrant odour, and a pungent, acidulous taste. Its spec. grav. should not exceed 0·834. It is very volatile and inflammable; and

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[1] *London Medical Review*, April, 1810, p. 164.

soluble in water and in alcohol. It coagulates tincture of guaiacum, giving it at the same time a deep blue colour; and it also strikes a deep olive with solution of green sulphate of iron.[1] Nitric æther, according to Thénard, consists of carbon 28·45, oxygen 48·52, hydrogen 8·54, and azote 14·49 in 100 parts; and according to a late analysis by MM. Dumas and Boullay, the spirit of nitric æther is a compound of four equivalents of carbon = 24·48 + 5 of hydrogen = 5 + 1 of nitrogen = 14·15 + 4 of oxygen = 32 = 75·63. The proportions of this æther in the spirit have not been determined.

Medical properties and uses.— Spirit of nitric æther is refrigerant, diuretic, and antispasmodic. It has long been employed under the title of *Sweet Spirit of Nitre*, as a grateful refrigerant, and to quench thirst in febrile affections; for which purpose the dose is from ♏xx. to ♏xl., given in a cupful of water, or any other appropriate vehicle. In larger doses, it acts as a gentle stimulant to the stomach, relieving nausea and flatulence; and also determines to the kidneys, increasing the flow of urine; on which account it is advantageously prescribed as an auxiliary to other diuretics in dropsical complaints.

ÆTHER SULPHURICUS CUM ALCOHOLE, Edin. *Sulphuric Æther with Alcohol.*

"Take of sulphuric æther, *one part*; alcohol *two parts*. Mix them."

LIQUOR ÆTHEREUS SULPHURICUS, Dub. *Sulphuric Æthereal Liquor.*

"Take of rectified spirit of wine, sulphuric acid, of each (by weight) *thirty-two ounces*. Let the spirit heated to 120° be poured into a glass retort fit to bear a sudden heat, and add the acid in an uninterrupted stream; let them be gradually mixed, and by means of a quick and sufficiently powerful heat, distil twenty ounces of the liquor into a receiver kept cool.

"If sixteen ounces of rectified spirit of wine be poured on the residuary acid in the retort, more sulphuric æthereal liquor will be obtained by repeating the distillation."

In the old method of preparing this spirit by distilling the charge for sulphuric æther by a slow and gradually increased heat, an alcoholized æther was obtained, owing to part of the alcohol first passing over unaltered before the æther was formed, the specific gravity of which was ·768; but the gravity

[1] Dr. Paris says (*Pharmacologia*), that this æthereal spirit, when added in a small proportion to malt spirits, communicates to them a flavour resembling that of *French brandy*.

of the above mixture is ·816, showing that it contains considerably less æther in combination with the alcohol.

Medical properties and uses. — It may be used for the same purposes as the æther; but it is necessarily much less active. The dose is from f ʒss. to f ʒij. An useful gargle for slight inflammation of the fauces is prepared by adding f ʒj. of this spirit to f ℥vj. of barley-water, sweetened with f ʒiv. of syrup of marsh-mallows.

SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS, Lond. *Compound Spirit of Æther.*

"Take of sulphuric æther, *eight fluid ounces;* rectified spirit, *sixteen fluid ounces;* æthereal oil, *three fluid drachms.* Mix them."

Syn. Alcohol éthéreux par l'acide sulphurique (*F.*), Atherischer Schwefelegeist Liquor (*G.*), Anodino minerale dell' Hoffman (*I.*).

This is intended as a substitute for the *anodyne liquor of Hoffmann;* and, besides being stimulant and antispasmodic, it is supposed to possess anodyne properties. It is an useful addition to tincture of opium, when given with the intention of procuring sleep; and often prevents the opium from exciting the nausea which it is apt to produce in some habits. The dose is from f ʒ ss. to f ʒ ij. in any appropriate vehicle.

ÆTHER NITROSUS, Dub. *Nitrous Æther.*

"Take of nitrate of kali, dried and coarsely powdered, *a pound and a half;* sulphuric acid, *a pound;* rectified spirit of wine, *nineteen fluid ounces.* Put the nitrate of kali into a tubulated retort, placed in a bath of cold water, and pour upon it in small quantities, and at intervals, the sulphuric acid and the spirit previously mixed together, and allow the mixture to become cold. Without any external heat, or at least a very gentle one (such as may be communicated by the addition of a little tepid water to the bath), an æthereal liquor will begin to distil. In a short time the heat of the retort will spontaneously increase, and a considerable ebullition take place, which must be moderated by adding some cold water to the bath. The receiver must also be kept cool with water or snow, and furnished with a proper apparatus for transmitting the very elastic vapour (arising from the mixture with great force, if the heat be too much increased) through a pound of rectified spirit of wine in a phial which is to be kept cold.

"The æthereal liquor, thus spontaneously distilled, is to be put into a glass phial, fitted with a ground glass stopper, and as much subcarbonate of kali, dried, and in powder, is to be added as is necessary to neutralize the acid, closing the phial after each addition of the kali, and determining the neutralization by the test of litmus: about a drachm of salt is generally sufficient for this purpose; and in a short time the nitrous æther will rise to the surface, and is to be separated by means of a funnel.

"If the æther is required to be very pure, distil it again from a water bath, at a temperature of 140°, to one half. Its specific gravity is to that of distilled water as 900 to 1000."

The action of nitric acid on alcohol is so violent, that the formation of æther which it affords has always been regarded as a process of great difficulty, to obviate which many ingenious plans have been suggested. The operation which has been just described, is admirably adapted for procuring it with facility and safety. It was contrived by Wolfe, and was found by Pelletier to succeed better than any other. The sulphuric acid and the spirit must be mixed with the same degree of caution as is necessary in preparing sulphuric æther; and the receiver must be larger, and kept perfectly cool, with the apparatus described in the formulæ attached to it, which should be kept cool by a mixture of snow or ice and chloride of lime.

In the above process, the nitrate of potassa is first decomposed, and nitric acid formed, which acts upon the alcohol as it evolves. The theory of this action is very obscure; but from a number of well-contrived experiments, Thénard was led to draw the following conclusions. Both the acid and the alcohol are decomposed; the oxygen of the former combines with a large proportion of the hydrogen, and a small quantity of the carbon of the alcohol; and thence result, "1st, Much water and nitrous oxide, and small quantities of carbonic acid, nitrous acid, and nitric oxide. 2dly, The separation of a small quantity of nitrogen, and the formation of much nitric æther by the combination in large quantity of the two elements of the nitric acid with the alcohol from which the large proportions of hydrogen and small proportion of carbon have been abstracted. 3dly, The formation of acetic acid, and of a matter disposed to pass to the state of charcoal, by the combination, in certain proportions, of the hydrogen and carbon of the alcohol with the oxygen of the nitric acid."[1]

Qualities.— Nitrous or rather nitric æther has a powerful æthereal odour, but is less fragrant than sulphuric æther. Its taste is strong and peculiar; and its colour slightly yellow, probably arising from the presence of a small portion of nitric oxide. When highly rectified, its specific gravity is 0·866.[2] It is more volatile than sulphuric æther, boiling at a temperature of 70°, and consequently producing a greater degree of

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[1] *Murray's Chymistry*, 2d edit. iv. 447.
[2] Duncan, *New English Dispensatory*, 5th edit. 567.

cold by its evaporation; and is very inflammable. It requires 48 parts of water for its solution, but combines with alcohol in every proportion; and readily absorbs nitrous and acetic acids, both of which acids are formed in it when it is kept for some time. According to the analysis of Thénard, the constituents of 100 parts of nitric æther are 48·52 of oxygen, 28·45 of carbon, 14·49 of azote, and 8·54 of hydrogen; but this analysis is liable to some exceptions. According to Dumas and Boullay, its elements are 1 eq. of æther = 37·48 + 1 eq. of hyponitrous acid = 38·15 making the equiv. = 75·63.

Medical properties and uses. — Nitric æther, although introduced into the Dublin Pharmacopœia, has not yet been generally used in practice; but it is probable that its properties are the same as those of sulphuric æther, and consequently it is applicable to the same cases.

ALKALIES[1] AND SALTS.[2]

THE general term ALKALI comprehends under it substances possessed of very important chemical properties, and capable of producing very powerful effects on the animal economy. Alkalies have an acrid, or pungent, urinous taste; are caustic, or dissolve animal matter; change the blue vegetable colours to green; serve in some instances as the means of combining oil and water; are capable of being fused and volatilized by a strong heat; have a great affinity for water; and combine with acids, forming neutral salts, in which the qualities of both the components are lost. All of them, however, do not display these properties; and therefore the term ALKALI is now proposed to be confined to those substances "which form definite compounds with acids, and which when liquid have an alkaline

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[1] The words *Kali* and *Alkali* are of Persian origin, and derived from the terms كليا and والك, or *Kalla* and *Alkalia*, signifying the ashes of marine plants. Vide *Good's Nosology, Prelim. Disc.* p. xcv. The Rev. W. Palmer, the professor of Arabic at Cambridge, gives the following as the origin of the term. "From the Arabic root قلع (*Kala*), to dress any thing by fire, is derived the substantive قلى (*Kilyon*), the ashes produced by burning the Salicornia or any other plant of the same nature. Hence *Kali*, with the article *Al-kali*."

[2] The title of this section in the London Pharmacopœia is *Alkalies and their Salts*; but as these salts cannot be termed Salts of Alkalies, in strict language, we formerly translated the phrase *neutral salts*; but, as this term applies also to salts in which there is no excess either of acid or of alkalies, we, therefore, have adopted the simple term salts.

re-action."[1] The discoveries of Sir H. Davy have clearly established that potassa, soda, lime, and magnesia are compound bodies, with metallic bases. They are affected by the air, and require to be preserved in well-stopped glass bottles.

The alkalies, in reference to their chemical properties, may be arranged nearly in the same manner as the acids.

I. ALKALIES COMPOSED OF A SIMPLE RADICAL WITH OXYGEN.

POTASSIUM + OXYGEN -	1. POTASSA.
SODIUM - - - -	2. SODA.
LITHIUM - - - - -	3. LITHIA
CALCIUM - - - - -	4. CALX.

II. ALKALIES COMPOSED OF A SIMPLE RADICAL WITH HYDROGEN.

NITROGEN + HYDROGEN 1. AMMONIA.

III. ALKALIES COMPOSED OF A COMPOUND RADICAL WITH OXYGEN.

HYDROGEN, CARBON, NITROGEN × OXYGEN

1. ACONITINA.
2. ATROPIA.
3. CINCHONIA.
4. BRUCIA.
4. DATURIA.
6. DAPHNINA.
7. DELPHIA.
8. EMETIA.
9. HYOSCIAMIA.
10. MORPHIA.
11. PICROTOXA.
12. QUINA.
13. STRYCHNIA.
14. VERATRIA.

Of these potassa, soda, lime, and ammonia, only, are employed in an uncombined state in pharmacy.

NEUTRAL SALTS, strictly speaking, have neither acid nor alkaline properties: but salts exist, formed by the combination of acids with alkalies, in which the properties of the one or the other predominate; and, consequently, although these are *secondary* salts, yet they cannot, in strict language, be denominated *neutral* salts. When the acid predominates, the salt is designated by the syllables *bi* or *super* being added to the appellation of the neutral salt, formed with the same acid and alkali; but when the alkali is redundant, the syllable *sub* is added; thus, if to carbonate of potassa be added a quantity of acid equal to that which it already contained, it becomes a Bicarbonate or a Supercarbonate of Potassa; but if there be less acid than in the neutral carbonate, the salt is a Subcarbonate of Potassa. The term *super*, however, is too indefinite, as some alkalies form more than one super salt. The British Pharmacopœias still use the term *oxy* in reference

[1] *Turner's Elements*, 4th edit. p. 630.

to acids; when the acidifying base, therefore, contains a maximum of oxygen, the syllable *ate* is prefixed to that of the salt; thus, *sulphate of potassa* denotes a salt composed of the sulphuric acid and potassa: when an alkali is united with an acid with a minimum of oxygen, the salt formed has the term *ite* prefixed to it; thus, *sulphite of potassa.* The first is salt formed by *sulphuric acid* and *potassa,* the second of sulphurous acid and the same alkali.

The neutral and secondary salts have very different degrees of solubility: but that of almost all of them is increased by an augmented temperature, while the solution is, for the most part, accompanied with a diminution of temperature. The same quantity will dissolve several different salts, which do not decompose one another. They may be obtained unaltered from solutions by evaporation; and if the process be slowly conducted, they form in regular crystallized masses, which have more or less transparency according to the quantity of water which they retain in their composition. A salt may contain half its weight of water, and yet appear dry. Exposure to air, heat, and moisture, variously affect the appearance of crystallized salts. When they lose their transparency and are covered with a white crust, or fall to powder on simple exposure to the air, such salts are said to *effloresce;* if, on the contrary, they attract moisture from the atmosphere, and become fluid, they are said to *deliquesce;* and they are *permanent,* when the air has no effect on their crystals. The circumstance of a salt first melting in a moderate heat, then becoming covered with a white crust, and ultimately being converted into a dry opaque mass, is termed *watery fusion;* but when, instead of melting, it splits, and the fragments fly off with a crackling noise, this effect is termed *decrepitation.* The first contain much water, the second are generally devoid of water.

The efflorescent and deliquescent salts should be preserved and dispensed in well-stopped bottles; while those that are permanent will not suffer from being put up in paper.

The alkalies have been employed as poisons; in which case the practitioner ought to be able to distinguish them from other acrid or caustic poisons. The volatile alkali is readily known by its odour; but if any of the fixed alkalies have been taken, besides the characters already enumerated, and which merely demonstrate the fact that the poison has been an alkali, the simplest method of ascertaining which of the alkalies is the poison in question, is to evaporate the solution, or some of the filtered fluid contents of the stomach, till it is concentrated, and then add a solution of chloride of platinum: if a yellow precipitate fall, the alkali is potassa; or if it be a simple aqueous solution, evaporate to dryness in a silver spoon or vessel: after which, by exposing the mass to the air, if the alkali be potassa it will rapidly deliquesce, but it will remain dry if it be soda. Vinegar is the best antidote of the alkaline poisons, when given early enough after the poison has been swallowed.

ACONITINA, Lond. *Aconitina.*

"Take of the dry, bruised roots of aconite, *two pounds*, rectified spirit, *three gallons*; diluted sulphuric acid, solution of ammonia, and purified animal charcoal, of each a *sufficient quantity*. Boil the aconite with one gallon of the spirit in a retort to which a receiver is fitted. Pour off the fluid; and again boil the residue with a fresh gallon of the spirit and what distilled over, and pour off the fluid. Let this be repeated a third time. Then express the aconite, and from the whole of the solutions, mixed and filtered, distil the spirit. Evaporate the residue to the thickness of an extract, which is to be dissolved in water and strained. Evaporate the solution with a gentle heat to the consistence of a syrup, and add to it as much sulphuric acid mixed with water as will dissolve the aconitina. Next drop in some solution of ammonia, and dissolve the precipitated aconitina with diluted sulphuric acid as before. Then add the animal charcoal, frequently agitating the mixture for a quarter of an hour; and finally, after again precipitating the aconitina by the solution of ammonia, wash and dry it."

The salt prepared by the foregoing process is one of that class of salts obtained from vegetable bodies, which the Continental chemists have termed alkaloids. I have already stated that it exists in Aconite; and the A. *paniculatum* is pointed out by the College of Physicians as that which should be employed to yield it; but every species of the genus possesses it in greater or less quantity. It exists in the roots of the plant in combination with an acid, which is still undetermined. The time to take up the roots is before the flower has seeded.

In order to procure the aconitina in granular crystals, it should be dissolved in alcohol, and left to spontaneous crystallization: but a large portion of it is uncrystallizable; there is consequently much waste in crystallizing it; but its purity is increased. It is said to be even in this state combined with another principle, named anemonin, from which it can be separated only "by repeated solution in and precipitation from acids." [1]

Qualities.—Aconitina is procured in inodorous, granular, greyish white crystals, which have a bitter, somewhat acrid

[1] Phillips, *Trans. of the Pharm.* p. 93.

taste: they are soluble in 150 parts of water at 60° Fah., and in 50 parts at 212°. Both alcohol and æther readily dissolve them, and the solutions have an alkaline reaction. The crystals fuse in a moderate, and are decomposed in a strong heat; and when decomposing they yield ammonia. They form bitter uncrystallizable salts with diluted acids: the nitrate is colourless; the sulphate is yellow at first, and afterwards becomes of a deep violet hue.

Medicinal properties and uses. — Aconitina is the active principle of the aconite, and consequently operates on the animal economy in the same manner, but in a concentrated degree. It has been employed by one practitioner, Dr. Turnbull, in neuralgic affections, in doses of the sixteenth of a grain, made into a pill with any bland powder; but the remedial effects ascribed to it require to be confirmed. As an external application, it operates as a counter-irritant; but its action is accompanied with a sensation of cold, which is not easily explained. An embrocation may be prepared by dissolving grs. viij. of aconitina in f ℥ij. of rectified spirit; or it may be used in the form of ointment, containing gr. j. of the alkaloid for each drachm of lard. It is preferable to render the aconitina more miscible with the lard by adding, previously to mixing the ointment, a few drops of alcohol to the aconitina.

AMMONIÆ SESQUICARBONAS[1], Lond. *Sesquicarbonate of Ammonia.*

"Take of hydrochlorate of ammonia, *a pound;* chalk, dried, *one pound and a half.* Pulverize them separately; then mix, and sublime with a gradually increased heat."

SUBCARBONAS AMMONIÆ, Edin. *Subcarbonate of Ammonia.*

"Take of muriate of ammonia, *one part;* softer carbonate of lime, dried, *two parts;* separately pulverize and mix them, and sublime from a retort into a receiver kept cold."

AMMONIÆ CARBONAS, Dublin. *Carbonate of Ammonia.*

"Take of muriate of ammonia reduced to powder, and well dried, carbonate of soda, dried, each *one part.* Mix: then put them into an earthen retort, and sublime the carbonate of ammonia with a heat gradually increased, into a receiver kept cold."

Syn. Carbonate d'ammoniaque (*F.*), Kohlensaures ammonium (*G.*), Drooges Kohlenzuures Ammonium (*Dutch*), Sottocarbonato di ammoniaco (*I.*).

This salt is produced by a double decomposition of the substances employed. The calcium of the lime of the chalk, which is decomposed, attracts the chlorine of the hydrochlorate

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[1] Ammonia præparata, P. L. 1788. Ammoniæ subcarbonas, P. L. 1824.

of ammonia, forming chloride of calcium, while the carbonic acid is attracted by the ammonia; and water is formed by the union of the hydrogen of the hydrochloric acid and oxygen of the lime, which is a compound of calcium and oxygen. The chloride of lime which is formed remains in the retort, while the sesquicarbonate of ammonia sublimes, and concretes into a cake on the sides of the receiver. The theory of the Dublin process, in which the carbonate of soda is ordered instead of chalk, is precisely the same, only less heat is required; but it is too expensive to be generally employed. The chalk, or the carbonate of soda, should be extremely well dried, and the ingredients very intimately mixed, that the decomposition may be as complete as possible. The retort should have a wide cylindrical neck; and the receiver have a nearly cylindrical form, to permit the concreted salt to be taken out without breaking the glass.[1]

Qualities. — Sesquicarbonate of ammonia has a penetrating, pungent odour, an acrid, penetrating taste, and a powerful alkaline reaction. It is usually in a white, semitransparent, hard mass, which breaks with a striated fracture; has the specific gravity of 0.966[2]; and is totally volatilized, when pure, in a moderate heat. It is soluble in less than four parts of water at 60°, and in an equal weight at 212°; but in the latter it effervesces, and is partially decomposed. It is soluble in proof spirit, but nearly insoluble in alcohol, which coagulates a strong solution of the salt to a spongy mass. Exposed to the air, it gradually effloresces and loses its pungent odour, and becomes a carbonate, owing either to the volatilization of the superabundant ammonia it contains, or to the absorption of carbonic acid from the air.

Bergman makes its constituents to be 45 parts of carbonic acid, 43 ammonia, and 12 water, — in 100 parts; but this statement has been shown to be erroneous; it is a sesquicarbonate, and the proportions are 55·93 carbonic acid, 28·81 ammonia, and 15·26 of water; or 2 eq. of ammonia $= 34{\cdot}30 + 3$ of carbonic acid $= 66{\cdot}72 + 2$ of water $= 18$: making its equivalent 119·02. Sir H. Davy, however, has found that the quantity of alkali varies according to the temperature

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1 This salt is prepared on a large scale, by mixing four parts of purified sulphate of ammonia, and one part of chalk, in fine powder, and submitting it to sublimation in an iron pot, to which the heat is directly applied, and which is connected with a large earthen or leaden receiver. This receiver is fitted with a leaden cover secured by a water joint, and it has a pipe in the bottom which is left open to admit the liquid products evolved during the sublimation to escape. *Grey's Operative Chymist*, p. 596. Large quantities, but very impure, are also produced in the distillation for the preparation of gas.

2 *Annales de Chimie*, xxviii. 12.

that has been employed in the preparation: thus, when it is formed at a temperature of 300°, it contains rather more than 50 per cent. of ammonia; but at a temperature of 60°, it contains only 20 per cent.

Sesquicarbonate of ammonia is decomposed by the acids, the fixed alkalies and their carbonates, bitartrate of potassa, sulphate of magnesia, the metallic salts, except the potassio-tartrate of iron, baryta, lime, and partially by magnesia.

Medical properties and uses.—This salt is stimulant, antispasmodic, antacid, diaphoretic, and in large doses emetic. It is beneficially given in gout, hysteria, and dyspeptic affections, when much acid is present in the stomach; and in infantile convulsions connected with dentition, or with acidity of the primæ viæ. As a diaphoretic it is occasionally exhibited in chronic rheumatism, in combination with guaiacum; and sometimes, although rarely, it is employed to produce vomiting in gouty and paralytic cases. From the ammonia it contains in excess, the sesquicarbonate is applied as a local stimulant to the nostrils in syncope, hysteria, and languors; and with the addition of a little scent, forms the common smelling-salts of the shops. One part of pulverized sesquicarbonate of ammonia, and three parts of extract of belladonna, spread on leather in the form of a plaster, is an excellent application for allaying rheumatic pains. The ordinary dose is from grs. v. to grs. xx. formed into pills, or dissolved in any aqueous vehicle; but to excite vomiting ʒss. may be given for a dose, and repeated if necessary, assisting its operation by plentiful dilution.

Officinal preparations. — *Liquor Ammoniæ Sesquicarbonatis,* L. *Liquor Ammoniæ Acetatis,* L. E. D. *Linimentum Ammoniæ Sesquicarbonatis,* L. *Cupri Ammonio-sulphas,* L. E. D. *Spiritus Ammoniæ,* D.

AMMONIÆ BICARBONAS. Dub. *Bicarbonate of Ammonia.*

"Take of solution of carbonate of ammonia, *any quantity;* expose it, in a proper apparatus, to a stream of carbonic acid gas, extricated from white marble by diluted muriatic acid; when the effervescence is over, the crystals are to be dried without heat, and preserved in closely stopped vessels."

The theory of this operation requires no explanation: the result is a salt, a carbonate, crystallized in small six-sided prisms, having scarcely any odour, and less taste than the sesquicarbonate. It is volatilized by heat; dissolves in eight parts of water; and is decomposed by potassa with the disengagement of ammonia. It may be obtained by the exposure of the sesquicarbonate to the air. According to Mr. Phillips, it is a compound of 55·70 of carbonic acid, 21·52 of ammonia, and 22·78 of water, in 100 parts: or of 2 eq. of carbonic acid $(22{\cdot}24 \times 2) = 44{\cdot}48 + 1$ ammonia $= 17{\cdot}15 + 2$ water $(9 \times 2) = 18$, making the equivalent $= 79{\cdot}63$.

Medical properties and uses. — The same as those of the sesquicarbonate. Its dose is from six to twenty-four grains. It may be given in combination with sulphate of magnesia.

LIQUOR AMMONIÆ[1], Lond. *Solution of Ammonia.*

"Take of hydrochlorate of ammonia, *ten ounces;* lime newly burnt, *eight ounces;* water, *two pints.* Put the lime, mingled with part of the water, into a retort, then add the hydrochlorate of ammonia, in fragments, and, lastly, the remaining water. Distil fifteen ounces of the solution of ammonia.

AQUA AMMONIÆ, Edin. *Water of Ammonia.*

"Take of muriate of ammonia, *one pound;* lime newly burnt, *one pound and a half;* distilled water, *one pound;* water, *nine ounces.* Upon the lime broken to pieces, pour the water in an iron or earthen vessel, cover it up, until the lime have fallen into powder and become cold, then rub the muriate to a fine powder, and triturate it with the lime in a mortar; after which put them directly into a green-glass retort. Place the retort in a sand bath, and adapt to it a receiver furnished with a tube passing into a phial containing the distilled water; the phial, however, being sufficiently large to hold double the quantity of water. Then apply the fire, gradually raising it, until the bottom of the iron pot be red-hot, and as long as gas and vapour are produced. The specific gravity of this solution of ammonia is to that of distilled water as 0·939 to 1000. It should be preserved in small phials well stopped."

AMMONIÆ CAUSTICÆ AQUA, Dub. *Water of Caustic Ammonia.*

"Take of muriate of ammonia, in powder, *three parts;* lime newly burnt, *two parts;* water, *ten parts.* Pour one part of the water, made hot, upon the lime placed in an earthen vessel, and cover it up. Dissolve the salt in the rest of the water also heated. After the saline solution is cold, add it to the lime now in powder, cooled and put into a retort; distil five parts, with a medium heat, into a receiver kept cool. The specific gravity of this solution should be to that of distilled water as 0·950 to 1000."

Syn. Dissolution d'ammoniaque (*F.*), Atzender Ammonium-liquor (*G.*), Vlugtiger etzender Salamoniak geest (*Dutch*), Liquore di Ammoniaco (*I.*).

In these processes, the lime having a superior affinity for hydrochloric acid, decomposes the hydrochlorate, from which

[1] Aqua ammoniæ puræ, P. L. 1787.

the ammonia is disengaged, and passes over in combination with the watery vapour. If the temperature of the water rise to 130°, the ammonia is again separated in the form of gas; and thence the necessity of keeping the receivers cold; but water at 60° takes up 780 times its bulk of gaseous ammonia: which increases the bulk of the liquid two thirds. The product thus obtained is an aqueous solution of ammonia; while hydrochlorate of lime remains in the retort, and may be dissolved out by twice its weight of water. The best proportions for extricating the ammonia, are equal parts of hydrochlorate of ammonia and of lime; thence in the London and the Dublin processes much of the ammonia is lost. A solution of sp. gr. 0·960 is obtained by adding *two* fluid ounces of water to one fluid ounce of the liq. ammoniæ fortior of commerce.[1]

Qualities.—Liquid ammonia is a limpid, colourless fluid. It has a very strong pungent odour, an extremely acrid taste, and corrodes the skin. Obtained according to the London College, its specific gravity is 0·960, to the Edinburgh ·9039, while that of the Dublin College is ·9310. The following table shows the strength of liquid ammonia of different degrees of specific gravity within a certain range (temp. 50° Fahr., pressure 29·8 barom.):—

100 parts Sp. Grav.	Contain of		100 parts Sp. Grav.	Contain of	
	Ammonia.	Water.		Ammonia.	Water.
·9000	26·00	74·00	·9513	12·40	87·60
·9054	25·37	74·63	·9545	11·56	88·44
·9166	22·07	77·93	·9573	10·82	89·18
·9255	19·54	80·46	·9597	10·17	89·83
·9326	17·52	82·48	·9619	9·60	90·40
·9335	15·88	84·12	·9684	9·50	90·50
·9435	14·53	85·47	·9639	9·09	90·91
·9476	13·46	86·54	·9713	7·17	92·83[2]

But Mr. Phillips says that the liquid ammonia of the London College of sp. gr. 0·960 is a compound of ammoniacal gas 10, water 90 parts, in 100.[3] For ordinary purposes it is useful to know that a phial capable of containing 224 grains of distilled water, can hold no more than 216 grains of the strong solution. At 46° Fahr. the ammonia in this solution crystallizes,

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[1] In the notes in the present London Pharmacopœia the quantity of water is improperly stated: "cuique fluidunciæ adjectis fluidunciis tribus aquæ distillatæ."

[2] *Davy's Researches*, p. 68.

[3] *Trans. of Pharm.* p. 96.

and at 68° the fluid assumes the appearance of a thick jelly, and becomes almost inodorous.

Liquid ammonia assists the oxidizement of copper and of zinc; dissolves many of the metallic oxides; and unites with all the acids without effervescence, forming neutral salts. It dissolves oils, resins, and many other vegetable principles. Its affinity for carbonic acid is so powerful, that it rapidly attracts it from the atmosphere; and hence the necessity of preserving it in well-stopped, small phials, as directed by the Edinburgh College. The acids, the metallic salts, and alum, are incompatible in formulæ with it. The constituents of the ammonia it contains, according to the latest experiments of Sir H. Davy, admitting the sp. gr. of ammonia to be 0·5902, or that of the concentrated solution 0·936, are 74 measures, by bulk, of hydrogen gas, and 26 of nitrogen gas; or, according to the analysis of Dr. Henry, 100 parts of ammonia consist of 80·36 of nitrogen, and 19·64 of hydrogen, by weight.[1] Mr. Phillips says 17·64 of hydrogen, and 82·36 of nitrogen; or it is 3 equivalents of hydrogen $=3+1$ equivalent of nitrogen $=14{\cdot}15$; making the equivalent 17·15.[2] The presence of carbonic acid in solution of ammonia may be readily detected by its effervescing with acids, and by adding to it hydrochlorate of lime, which forms a precipitate if carbonic acid be present.

Medical properties and uses. — This solution of ammonia is stimulant, antacid, and rubefacient. It is usefully employed, when largely diluted, in paralysis, hysteria, and syncope: and is, perhaps, superior to all the other antacids in relieving cardialgia and other symptoms of acidity of the stomach. As a local stimulant it is applied to the nostrils in faintings; and a rag moistened with it, and laid over the scrobiculus cordis, sometimes raises an instantaneous blister, and, by quickly inflaming the skin, always proves useful in spasms and gout in the stomach. Combined with a small portion of oil, it forms a saponaceous rubefacient, which is beneficially applied to the throat in inflammatory sore throat, and as a friction in deep-seated inflammation and rheumatism. The dose of the solution is from ♏x. to ♏xx. in a large cupful of cold water or milk. When taken as a poison, if death be not the immediate result, the best antidote is vinegar.

Officinal preparations. — *Hydro-sulphuretum Ammoniæ*, E. D. *Oleum ammoniatum*, E. *Spiritus Ammoniæ aromaticus*, L. *Linimentum Ammoniæ*, L. D. *Hydrargyri Submurias ammoniatum*, D. *Calcis Phosphas præcipitatum*, D. *Spiritus Ammoniæ fœtidus*, L. *Lin. Camphoræ comp.*, L.

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[1] *Philosophical Transactions*, 1809. [2] *Transl. of Pharm.* p. 38.

AQUA AMMONIÆ DILUTA, Edin. *Diluted Water of Ammonia.*

"Take of water of ammonia, *one part;* distilled water, *two parts.* Mix them together."

This preparation is probably intended for facilitating extemporaneous prescription; but, as the solution of ammonia is never given except in a diluted form, it appears to be superfluous.

LIQUOR AMMONIÆ ACETATIS[1], Lond. *Solution of Acetate of Ammonia.*

"Take of sesquicarbonate of ammonia, *four ounces and a half;* distilled vinegar, *four pints.* Add the sesquicarbonate of ammonia to the vinegar to saturation."

AQUA ACETATIS AMMONIÆ, Edin. *Water of Acetate of Ammonia.*

"Take of carbonate of ammonia in powder, *any quantity.* Pour upon it as much weak acetic acid as will exactly saturate the ammonia."

AMMONIÆ ACETATIS AQUA, Dub. *Water of Acetate of Ammonia.*

"Take of carbonate of ammonia, *one part.* Add by small portions, with frequent agitation, as much distilled vinegar as will saturate the ammonia, viz. *about thirty parts.* This may be ascertained by means of litmus."

Syn. Acetate d'ammoniaque liquide (*F.*), Essigsaures Ammonium liquor (*G.*); Liquore di Minderero (I.).

The sesquicarbonate of ammonia employed for this preparation is decomposed by the acetic acid of the distilled vinegar; which, combining with the ammonia, forms an acetate that remains dissolved in the water, while the disengaged carbonic acid flies off in the form of gas, exciting effervescence. In our experiments, distilled vinegar of a specific gravity of 1·007 required 320 grains of the sesquicarbonate to saturate a pint.[2] Owing, however, to the variable proportion of acid in distilled vinegar, this preparation cannot be obtained of an uniform strength; and provided it be accurately neutralized, which is easily known by using litmus and turmeric paper, its uniformity of strength is of little importance. If it be not accurately saturated, some of the metallic salts, particularly those of antimony, which are often ordered in conjunction with it, are decomposed.

Qualities. — This solution is inodorous; has a slightly nauseous taste; and, when made with pure materials, is limpid and nearly colourless. It is decomposed by the fixed alkalies,

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[1] Aqua ammoniæ acetate, P. L. 1787.

[2] The mercury of a thermometer, the bulb of which was immersed in the solution while effervescing, sunk five degrees.

the strong acids, alum, magnesia, lime-water, sulphate of magnesia, bichloride of mercury, nitrate of silver, the sulphates of zinc, copper, and iron, and acetate and diacetate of lead, which are consequently incompatible in formulæ with it.[1]

Medical properties and uses. — As a diaphoretic it is in common use in febrile diseases; and may be combined with opium, camphor, antimonials, or nitrate of potassa. It is necessary to assist its determination to the skin with plentiful dilution, and a moderate degree of external heat; for by free exposure to cool air it excites the kidneys, instead of opening the skin. Externally it is employed as a discutient; as a lotion to inflamed surfaces; and when diluted with rose water, holding in solution a small portion of opium, it is an excellent collyrium in chronic ophthalmia; and still more largely diluted, is occasionally used as an injection in the commencement of gonorrhœa. In the crystallized form it has proved beneficial in painful menstruation. I have used it with the best effect as a lotion in porrigo, affecting the scalp. The ordinary dose is from f ʒ iv. to f ʒ xij., given every three or four hours.

LIQUOR AMMONIÆ SESQUICARBONATIS, Lond. *Solution of Sesquicarbonate of Ammonia.*

"Take of sesquicarbonate of ammonia, *four ounces;* distilled water, *a pint.* Dissolve the sesquicarbonate of ammonia in the water, and filter through paper."

SOLUTIO SUBCARBONATIS AMMONIÆ, Edin. *Solution of Subcarbonate of Ammonia.*

"Take of subcarbonate of ammonia, *one part;* distilled water, *four parts.* Dissolve the subcarbonate in the water, and filter through paper."

AMMONIÆ AQUA CARBONATIS, Dub. *Water of Carbonate of Ammonia.*

"Take of carbonate of ammonia, *four parts;* distilled water, *fifteen parts.* Dissolve the carbonate of ammonia in the water, and filter. The specific gravity of this liquor is, to that of distilled water, as 1090 to 1000."

Syn. Soucarbonate d'ammoniaque (*F.*) Kohlensaures Ammonium liquor (*G.*), Liquore Sotto-carbonato di ammoniaco (*I.*).

This solution has the odour and taste of the concrete sesquicarbonate; it is limpid and colourless; and when shaken with twice its bulk of alcohol, a nearly uniform

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[1] M de Lassone first obtained the salt crystallized by sublimation, in long slender, flatted crystals, terminating in sharp points, an inch in length, and of a pearl-white colour. I have obtained them three times that length. They are very deliquescent; impress on the tongue a sense of coldness and sweetness; melt at 170°, and sublime at about 250°. According to Richter, they consist of 68·77 acid, and 31·23 base. They may be readily procured by passing a stream of ammoniacal gas into a solution of strong acetic acid.

coagulum is formed. The specific gravity of that of the London College should be 1150. It ought to be kept in small, well-stopped bottles, as by exposure to the air its pungency suffers diminution.

Medical properties and uses. — The same as those of the concrete salt. It is given in doses of from f ʒss. to f ʒj. in any bland fluid.

MORPHIA, Lond. *Morphia.*

"Take of the hydrochlorate of morphia, *one ounce;* of solution of ammonia, *five fluid drachms;* of distilled water, *a pint.* Add to the solution of ammonia diluted with an ounce of distilled water, the hydrochlorate of ammonia dissolved in the remainder of the water. Wash the precipitate in distilled water, and dry it with a gentle heat."

In this process, the superior affinity of the ammonia than the morphia for the hydrochloric acid, occasions the decomposition of the hydrochlorate; the morphia being little soluble is thrown down, and hydrochlorate of ammonia remains in solution.

Qualities. — Pure morphia, by this process, is thrown down in a flocculent form; but when it is stirred and left at rest, it crystallizes: but it is most perfectly crystallized when it is dissolved in alcohol. Its crystals are six-sided prisms, with dihedral summits. They consist of 1 eq. of anhydrous morphia $=288{\cdot}23+2$ eq. of water $=18$, making the equivalent $=306{\cdot}41$.[1] The anhydrous salt consists of—

34 eq. of	carbon	=	208·08	or	71·83
18 —	hydrogen	=	18·0	—	6·33
6 —	oxygen	=	48·0	—	16·90
1 —	nitrogen	=	14·15	—	4·94
	Equiv.		288·23		100·00

This salt is almost insoluble in cold, and sparingly so in boiling water. It is readily soluble in 40 parts of alcohol at 60°, and in 30 at 212°; and in the fixed and volatile oils: but it is scarcely soluble in æther. The pure alkalies dissolve it. Nitric acid decomposes it, forming at first a red solution, which becomes yellow, and is converted into oxalic acid. Persalts of iron give it a blue tint. When added to iodic acid, it decomposes the acid, and evolves iodine.

Medical properties and uses. — Owing to its little solubility, morphia is rarely employed as an internal remedy. I have employed it with great advantage as an external application, sprinkled on blistered surfaces, in neuralgia, spasm, and stiff

[1] Liebig.

joints. If more than two grains be thus used for one sprinkling, it causes inconvenient narcotic effects.

Officinal preparations. — *Morphiæ Acetas*, L. *Morphiæ Hydrochloras*, L.

MORPHIÆ ACETAS, Lond. *Acetate of Morphia.*

"Take of morphia, *six drachms;* acetic acid, *three fluid drachms;* distilled water, *four fluid drachms.* Mix the acid with the water, and pour it upon the morphia to saturation. Evaporate the solution with a gentle heat, that crystals may form.

This process forms a variable salt owing to the expulsion of a portion of the acid during the evaporation of the salt to dryness.

Qualities. — Acetate of morphia rarely crystallizes in a regular manner; it is usually in the form of a greyish-white powder, which, when examined by a magnifying lens, displays irregular radiated masses of acicular crystals. It is also deliquescent, which varies its strength when it is kept for some time. It is very soluble in water; but the water should be slightly acidulated, as, when neutral, it is partially decomposed by water. The solution is decomposed by the alkalies, their carbonates, and the metallic salts, and the morphia precipitated. The best mode of employing the acetate is to dissolve a given weight of the morphia in an excess of diluted acetic acid.

Acetate of morphia is a compound of 1 eq. of morphia $=$ $288{\cdot}23 + 1$ acetic acid $= 51{\cdot}48$, making the equiv. $= 339{\cdot}71$, or $84{\cdot}77$ parts of morphia $+ 15{\cdot}23$ of acetic acid in 100 parts of the salt.

Medical uses.—Acetate of morphia possesses narcotic powers, and may be employed in all cases in which opium is useful; but it has an advantage over opium in not causing headache or sickness. It, however, determines more to the skin than opium, and consequently should not be ordered in phthisis when the morning sweats are prevalent. The dose is from gr. $\frac{1}{6}$ to gr. $\frac{1}{2}$, in any bland vehicle.

MORPHIÆ HYDROCHLORAS, Lond. *Hydrochlorate of Morphia.*

"Take of sliced opium, *one pound;* of crystals of chloride of lead, *two ounces, or a sufficient quantity;* of purified animal charcoal, *three ounces and a half;* of hydrochloric acid, distilled water, solution of ammonia, each as much as may be requisite: macerate the opium in four pints of distilled water for thirty hours, and bruise it; then digest for twenty-four hours, and press. Macerate what remains again, and a third time, in water, that it may become tasteless, and each time bruise and press. Evaporate the mixed solutions, at a heat of 140°, to the consistence of syrup. Then add three pints of distilled water; and when all the fæces have subsided, decant the supernatant fluid. Add to this, gradually, two ounces of chloride of lead, or as much as may be sufficient, first dissolving it in four pints of boiling distilled water until nothing more is precipitated. Decant the fluid, and wash the residue frequently with distilled water. Then evaporate the mixed liquors as before, with a gentle heat, that crystals may be formed. Press these in a cloth, then dissolve them in a pint of distilled water, and digest with an ounce and a half of animal charcoal, at a heat of 120°, and strain. Finally, the charcoal being washed, evaporate the fluids carefully, that pure crystals may be obtained. Mix the decanted fluid, from which the first crystals have been formed, with a pint of water, and gradually drop in as much solution of ammonia, frequently shaking it, as may be sufficient to separate all the morphia. To this, washed, add distilled water acidulated with hydrochloric acid, that it may be saturated; then digest with two ounces of animal charcoal, and strain. Lastly, evaporate carefully the washing from animal charcoal and other fluids, that pure crystals may be obtained."

In this complex process, the meconate of morphia contained in the opium is decomposed by the chloride of lead: at the same time a portion of the water is also decomposed, in order to furnish hydrogen to the chlorine to change it into hydrochloric acid, and oxygen to the lead to form it into a protoxide: the former unites with the morphia to form the hydrochlorate of morphia; and the latter with the freed meconic acid to form a meconate of oxide of lead, which, being insoluble, is precipitated. As opium contains a small proportion of a sulphate, a little sulphate of lead is also precipated with the meconate. The intention of the precipitation with ammonia, and the subsequent addition of the diluted hydrochloric acid, is to get the whole of the morphia: that of the addition of the animal charcoal, is to decolorize the salt.

The process which I have proposed, is, in my opinion, much simpler, and capable of obtaining a larger quantity of the hydrochlorate from a given quantity of opium. It consists in rubbing the opium in a hard, dry state, into a powder with clean sand, putting the whole into a percolator,[1] with a piece of clean rag tied over the lower opening, and passing cold distilled water through until it acquires no taste. This solution is to be evaporated to the consistence of syrup, and then thrown into four times the quantity of distilled water, and the fæces allowed to subside. The fluid is

[1] For the description and a figure of this instrument, see *Part* i.

to be decanted, and the residue well washed with distilled water. To the separated fluids a saturated solution of chloride of barium is next to be added, until no more precipitate is thrown down; and the insoluble meconate of baryta, thus formed, is to be separated by the filter, and well washed upon it. The fluid is now to be evaporated by a gentle heat to form crystals, which are to be pressed, redissolved in water, and digested with pure animal charcoal at a temperature of 120°, and strained. The strained fluid and the washings of the charcoal are to be submitted to cautious evaporation, to form crystals. The residual fluid, which is viscid, from the pressure of the first crystals, being evaporated nearly to dryness, is to be largely diluted, and treated as before, to obtain any hydrochlorate of morphia which it may hold in solution.

I have procured a much larger proportion of hydrochlorate of morphia by this process than by that of the Pharmacopœia.

Qualities.—Hydrochlorate of morphia crystallizes in tufts of acicular crystals, which are anhydrous, nearly colourless, inodorous, and bitter; scarcely soluble in alcohol, but readily soluble in 20 parts of water at 60°, and in 10 parts at 212°. They consist of one eq. of morphia $= 288{\cdot}23 + 1$ of hydrochloric acid $= 36{\cdot}42$, making the equiv. $= 304{\cdot}65$, or $88{\cdot}48$ parts of morphia$+11{\cdot}58$ of acid, in 100 parts. The solution of this hydrochlorate is decomposed by the alkalies, ammonia, nitrate of silver, and the salts of lead; consequently it is incompatible in prescriptions with them.

Medical properties and uses.—The hydrochlorate of morphia is employed as a narcotic, and is preferred to the acetate, on account of its more definite strength, and owing to its exciting less perspiration. It is also much less subject to decomposition than the acetate. It dose is from gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$, in any bland fluid.

PREPARATIONS OF POTASSA.

LIQUOR POTASSÆ[1], Lond. *Solution of Potassa.*

"Take of carbonate of potassa, *fifteen ounces;* lime, *eight ounces;* boiling distilled water, *a gallon.* Dissolve the carbonate of potassa in half a gallon of the water. Sprinkle a little of the water on the lime in an earthen vessel, and the lime being slaked; add the rest of the water. Mix the hot liquors

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[1] Aqua Kali Puri, P. L. 1787. Lixivium Causticum, Potassa pura liquida.

together in a covered vessel, and agitate them frequently until they are cold. Then set aside until the carbonate of lime subsides. Lastly, keep the supernatant liquor, when poured off, in a well-stopped green glass bottle."

AQUA POTASSÆ, Edin. *Water of Potassa.*

"Take of lime fresh burnt, *eight ounces;* subcarbonate of potassa, *six ounces;* boiling water, *twenty-eight ounces.* Let the lime be put into an iron or earthen vessel, with twenty ounces of the water. When the ebullition ceases, immediately add the salt, dissolved in the remaining eight ounces of the water; and having thoroughly mixed the whole, cover the vessel till the mixture cool. The mixture being cooled, agitate it well, and pour it into a glass funnel, the tube of which is obstructed with a piece of clean linen. Cover the upper orifice of the funnel while its tube is inserted into another glass vessel, that the solution of potassa may gradually drop through the linen into the lower vessel. When it first ceases to drop, pour a few ounces of water into the funnel, but cautiously, so that the fluid may swim above the matter. The water of potassa will again begin to drop. The effusion of water, however, must be repeated until three pounds have filtered, which will be in the space of two or three days; then let the upper parts of the solution be mixed with the lower by agitation, and preserve it in a well-stopped vessel."

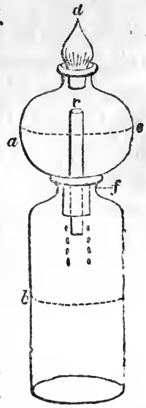
AQUA POTASSÆ CAUSTICÆ, Dub. *Water of Caustic Potassa.*

"Take of lime fresh burnt, carbonate of potassa, each *two parts;* water, *fifteen parts.* Pour upon the lime, put into an earthen vessel, one part of the water, made hot; and when it is slaked, mix the salt with the lime, and the rest of the water. Pour the materials, as soon as they are cold, into a well-stopped bottle, and keep it for three days, frequently shaking the bottle: after the carbonate of lime shall have subsided, pour off the supernatant liquor, and preserve it in well-closed green glass bottles.

"The specific gravity of this solution is, to that of distilled water, as 1080 to 1000."

Syn. Dissolution de Potasse (*F.*), Flüssiges ätzendes Kali (*G.*), Potachlog (*Dutch*), Liquore di Potassa (*I.*).

The *rationale* of these processes is very obvious: the lime attracts the carbonic acid of the carbonate of potassa, and leaves its alkaline base in a state of purity dissolved in the water. In considering the proportions of the two latter of these processes, there appears *à priori* a much larger proportion of lime ordered than is necessary for the decomposition of the carbonate of potassa: but the superabundance is necessary to ensure the entire separation of the carbonic acid from the potassa. If the solution be filtered, unless much care be taken to exclude the air during the filtration, carbonic acid will be rapidly attracted from the atmosphere. Calico is the best substance for stopping the mouth of the funnel, and it should be supported on a rough pebble or silicious stone, previously dropped into the funnel, and allowed to settle itself: but the method of the present Pharmacopœia is preferable to filtering in an open funnel, as no carbonic acid is attracted when the supernatant fluid is simply decanted from the carbonate of lime. When the solution requires to be filtered, the simplest apparatus is that figured in the margin. It consists of a globular vessel *a*, fitted with a ground stopper *d*, and furnished with a perforated neck *f*, ground into the bottle *b*: a tube *c* is fixed into this neck, wrapped round with as much clean linen or calico as is required to fill up the orifice. In using this filter, the solution is to be introduced into *a*, as high as *e*, so that the upper extremity of *c* shall be above the level of the fluid. The globular filter is then closed by the stopper, and as the filtering proceeds, the air displaced by the fluid dropping into *b*, passes up through *c*, and thereby does not interrupt the process. The solution should be kept in small green glass bottles, fitted with ground stoppers, to prevent the absorption of carbonic acid from the atmosphere.



Qualities. — Solution of potassa is inodorous, and so caustic as not to admit of being tasted. It is limpid, colourless, dense, and has an oily appearance when agitated; displays a strong alkaline reaction; does not effervesce with acids; and ought not to afford a precipitate with lime-water; but it is seldom procured so pure. It feels soapy when rubbed between the fingers, owing to the solution of the cuticle. When perfectly pure, it remains transparent on the addition of barytic water. Prepared according to the formulæ of the Pharmacopœias, it is not a simple solution of potassa, but contains small portions of hydrochlorate and of sulphate of potassa, silica, and generally some lime. The presence of hydrochlorates may be discovered by saturating a portion of the solution with nitric acid, then adding nitrate of baryta to precipitate the sulphates, if any; and, lastly, adding a solution of nitrate of silver, which is precipitated if any hydrochlorate be present. Sulphates are discovered by saturating with hydrochloric acid, and adding chloride of barium; and, if lime be present, the addition of a carbonate of potassa; or blowing into the solution through a tube will render it turbid; but these contaminations do not alter its properties as a remedy, nor as a pharmaceutical agent.

One pint of it should weigh sixteen ounces; or the specific gravity be 1·063; and it should contain 4·7 per cent. of pure potassa.[1] It dissolves alumina, gum, extractive, and resin, and converts fat and oils into soaps. It is incompatible with acids, acidulous salts, sesquicarbonate, acetate, and hydrochlorate of ammonia, metallic salts, especially the chlorides of mercury.[2]

Medical properties and uses. — This solution is antacid, diuretic, and lithontriptic. The two first properties it certainly possesses in a considerable degree: but its continued use, even when much diluted, is said to debilitate, and otherwise injure the stomach. As a solvent of calculus, both in the kidneys and bladder, this alkali has long been celebrated: it acts, however, on calculi composed of uric acid, or of urate of ammonia, only; the presence of which in the habit is known by a red deposit in the urine of the patient. But although the continued use of solution of pure potassa certainly renders the urine alkaline, yet there is reason to believe that its solvent effects on calculous matter in the kidney or the bladder are not equivalent to the irritation which its long use excites both in the stomach and the bladder; and as a prophylactic, its place can be much better supplied by magnesia and the alkaline carbonate. This alkaline solution has also been found useful in gout; in indurations and enlargements of the glands, and in scrofula, and even secondary syphilis. Dr. Willan says, he has seen the most beneficial effects experienced from the internal use of this solution in lepra[3]: and from my own experience I can assert, that it may be almost regarded as a specific in the various species of psoriasis, which depend altogether on acidity of the primæ viæ, and a hasty and consequently imperfect formation of the juices of the stomach. It is also used as a local stimulant, much diluted, in the form of lotion, to the joints, in rachitis and gouty swellings; and, in its concentrated state, as a caustic, to destroy the poison introduced by the bite of rabid or venomous animals.

The dose of this solution may be from ♏ x. to f ʒ j. taken in

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[1] Table of the Strength of Solutions of Potassa.

Spec. Grav.	Per cent. of Potassa.	Spec. Grav.	Per cent. of Potassa.
1·47	39·6	1·15	13·
1·42	34·4	1·11	9·5
1·33	26·3	1·06	4·7
1·23	19·5		

[2] Pure soda when rendered incandescent emits a yellow light, which distinguishes it from pure potassa.

[3] *Willan on Cutaneous Diseases*, p. 141.

chicken broth, milk, or almond mixture[1]; but in cases of psoriasis, it should be gradually increased to f ʒ ij. In cases of simple acidity of the stomach it may be administered in some bitter infusion, namely, infusion of orange peel, or in mild ale, or in broth, or in milk.

When over-dosed, or taken as poisons, the influence of the alkalies is best counteracted by acids; administering at the same time oil and demulcents.

Officinal preparations.—*Potassæ Hydras*, L. E. D. *Potassa cum Calce*, L. E. D. *Liquor Sulphureti Kali*, D. *Antimonii Oxysulphuretum*, L. E.

LIQUOR POTASSÆ CARBONATIS, Lond. *Solution of Carbonate of Potassa.*[2]

"Take of carbonate of potassa, *twenty ounces;* distilled water, *a pint.* Dissolve the carbonate of potassa in the water; and filter the solution through paper."

POTASSÆ CARBONATIS AQUA, Dub. *Water of Carbonate of Potassa.*

"Take of carbonate of potassa from crystals of tartar, *one part;* distilled water, *two parts.* Dissolve and filter."

The specific gravity of this solution is, to that of distilled water, as 1320 to 1000.

Syn. Dissolution de Soucarbonate de Potasse (*F.*), Flüssiges Kohlensaures Kali (*G.*), Liquore di Sotto-carbonato di Potassa (*I.*).

In both these formulæ the preparation is procured always of a definite strength. The bulk of the fluid is increased rather more than one third part.

Qualities.— This solution should be perfectly clear, colourless, and inodorous; and possess the properties of the carbonate, from which it is prepared. It cannot enter into extemporaneous formulæ with vegetable infusions containing much tannin, or with lime-water, magnesia, sulphate of magnesia, or the metallic salts; as these substances decompose it, or are decomposed by it.

Medical properties and uses.— These are the same as those of the concrete salt. The dose may be from ♏ x. to f ʒ ij. in any convenient vehicle.

POTASSA CUM CALCE, Lond. *Potassa with Lime.*[3]

"Take of hydrate of potassa, of lime, each *an ounce.* Rub them together, and keep them in a well-stopped bottle."

POTASSA CUM CALCE; olim, CAUSTICUM COMMUNE MITIUS, Edin. *Potassa with Lime; formerly, Milder common Caustic.*

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[1] Table-beer is sometimes recommended as the vehicle for administering it, but that liquor is seldom so free from acid as not to destroy the alkaline properties of the remedy.

[2] Aq. Kali præparatum, P. L. 1787. [3] Calx e Kali Puro, P. L. 1778.

"Take of the water of potassa, *any quantity*. Evaporate it to one third part in a covered iron vessel, then mix with it as much newly-slaked lime as will bring it to the consistence of a solid paste, which is to be preserved in a well-stopped vessel."

POTASSA CAUSTICA CUM CALCE, Dub. *Caustic Potassa with Lime.*

"Evaporate water of caustic potassa to one fourth part; then add as much fresh-burnt lime, in powder, as will form a mass of a proper thickness, which is to be preserved in a well-stopped bottle."

The addition of the lime in these preparations renders the potassa less deliquescent, and consequently more manageable as an escharotic.

POTASSÆ HYDRAS, Lond. *Fused Potassa.*[1]

"Take of solution of potassa, *a gallon*. Evaporate the water in a clean iron vessel over the fire, until, the ebullition having ceased, the hydrate of potassa melts: pour into proper moulds."

POTASSA; olim, CAUSTICUM COMMUNE ACERRIMUM, Edin. *Potassa; formerly, Stronger common Caustic.*

"Take of solution of potassa, *any quantity*. Evaporate in a covered, very clean, iron vessel, until, the ebullition being over, the saline matter flow smoothly like oil, which happens before the vessel becomes red-hot. Then pour it out upon a clean iron plate; cut it into small masses before it hardens, and let it be preserved in well-stopped phials."

POTASSA CAUSTICA, Dub. *Caustic Kali.*

"Take of solution of caustic potassa, *any quantity*. Evaporate it over the fire in a clean iron vessel, until, the ebullition having ceased, the saline matter, on increasing the heat, remains almost quiescent in the vessel. Pour out the melted salt upon a clean iron plate; and while it is concreting, let it be cut into proper pieces, which must be immediately put into a phial closely stopped. During the evaporation the operator must avoid the drops which may be thrown out from the vessel."

Syn. Potasse fondue (*F.*), Trocknes ätzendes Kali (*G.*), Pietra caustica (*I.*), Reine Potasche (*Dutch*).

The concrete potassa procured by these processes is a hydrate, sufficiently pure for medical purposes, but it still contains the same foreign ingredients as the solution. To procure it as pure and free as possible from carbonic acid, the evaporation should be performed in a silver vessel, very quickly; the

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[1] Kali Purum, P. L. 1787. Cauterium potentiale, Lapis causticus, Potassa fusa, P. L. 1824.

vessel should be deep, so that the watery vapour which rises may exclude the atmospheric air. It is generally run into moulds, and formed into solid cylinders, which are covered with paper, and kept in well-stopped bottles. The method of Berthollet [1] for obtaining it in perfect purity, which is usually described in chemical and pharmaceutical works, is too troublesome and expensive to be generally adopted. The following method proposed by Lowitz is more economical.

A solution of potassa must be evaporated till a pellicle form on its surface, then allowed to cool; and the saline deposit, which consists chiefly of the foreign salts, carefully separated. The evaporation is then to be renewed, skimming off the pellicles that form on the surface of the fluid, which, as soon as these cease to be produced, and the ebullition is ended, must be removed from the fire, and constantly stirred till it is cold. The mass is next to be dissolved in twice its weight of distilled cold water, the solution filtered, and evaporated in a clean iron or silver basin [2] until crystals are deposited. If the heated fluid consolidate into a mass, in any degree, a small portion of water must be added, and the mass again heated to fluidity. The supernatant liquor is left of a brown colour, which, after being kept for some time at rest in well-stopped phials, deposits the colouring matter, and may be again evaporated and crystallized as before. The crystals obtained in the various evaporations, are colourless, pure hydrate of potassa.[3]

Qualities.—Concrete, pure potassa is a fused *hydrate* of the salt. It should be a white brittle substance, having the peculiar odour of slaking quicklime, and a degree of causticity which prevents it from being tasted. It is usually, however, of a bluish colour. It attracts water and carbonic acid rapidly from the atmosphere, and is completely soluble in less than its own weight of that fluid at 60°, caloric being evolved during the solution. It dissolves readily in alcohol. When heated to 360°, it melts, and at a red heat is volatilized. Its sp. gr. is 1·706. It unites with sulphur, the acids, many of the metallic oxides, and the fixed oils. Its constituents are, potassa 84·2, and water 15·8, in 100 parts [4]: or, 1 eq. of potassa $(K+O) = 47{\cdot}15 + 1$ water $= 9$: making the equivalent 56·15. $(K+H)$.

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[1] *Journal de Physique,* xxviii. 402.

[2] Lowitz orders the evaporation to be performed in a glass retort; but pure potassa, when hot, dissolves glass.

[3] *Nicholson's Journal,* 4to. i. 164.

[4] *Phillips's Trans. of Pharm.* 1837. Potassa is a protoxide of potassium, consisting of 1 potassium $= 39{\cdot}15 \times 1$ oxygen $= 8$; making the equivalent 47·15.

Medical properties and uses.—Concrete potassa is used only as an escharotic, for forming issues in diseases of the hip-joint, the spine, and in deep-seated inflammations. It erodes the skin and soft parts beneath it to a certain extent, destroying the life of the part, which is subsequently thrown off as a slough, and an ulcer is left. To prevent inconvenience from its deliquescent nature, the skin should be covered with a piece of calico, spread with adhesive plaster, and having a hole in its centre sufficient to bare the part only where it is intended to apply the caustic. It is much and justly recommended for the removal of strictures of the urethra.

POTASSÆ ACETAS, Lond. *Acetate of Potassa.*

"Take of carbonate of potassa, *a pound;* of acetic acid, *twenty-six fluid ounces;* distilled water, *twelve fluid ounces.* Mix the acid with the water, and add to it the carbonate of potassa to saturation: then filter. Evaporate the solution on a sand bath, the heat being gradually applied until the salt is dried."

ACETAS POTASSÆ, Edin. *Acetate of Potassa.*

"Take of very pure carbonate of potassa, *one pound;* weak acetic acid, *a sufficient quantity.* Boil the subcarbonate in five pounds of the acid; and add more acid at different times, until, the watery part of the former portion being nearly dissipated by evaporation, the acid newly added occasion no effervescence, which will be the case when about twenty pounds of it have been consumed; then evaporate slowly to dryness. Liquefy this impure salt with a gentle heat for a short time; then let it be dissolved in water, and filter it through paper. If the liquefaction have been properly performed, the filtered fluid will be limpid; but, otherwise, of a brown colour. Afterwards evaporate this fluid in a shallow glass vessel, so that when removed from the fire it may pass into a crystalline mass. Finally, the acetate of potassa ought to be preserved in closely shut vessels."

POTASSÆ ACETAS, Dub. *Acetate of Potassa.*

"Take of carbonate of potassa from crystal of tartar, *any quantity.* Add to it gradually about five times its weight of distilled vinegar moderately heated. When the effervescence shall have ceased, and the fluid is somewhat evaporated, add, at intervals, more distilled vinegar, until the mixtures entirely cease to effervesce; then evaporate to dryness, and having raised the fire a little, cautiously liquefy the mass. Dissolve the salt in water, after it is cold: filter the solution, and let it be boiled, until, on being removed from the fire, it concrete into a crystalline mass, which should be very white. Put this mass, at the moment, into closely stopped bottles."

Syn. Kali acetatum, P. L. 1787. Acetate de Potasse (*F.*), Easigsaures Kali (*G.*), Azynzuure Potasch (*Dutch*), Acetato di Potassa (*I.*).

In these processes, the acetic acid combines with the potassa of the carbonate, and expels the carbonic acid in a gaseous form, exciting effervescence. Owing to the largely diluted state of the acid in distilled vinegar, a very considerable quantity is required to saturate the potassa: the London College, therefore, now order the acetic acid, diluted with less than half its measure of water, to be used. Towards the point of saturation, when distilled vinegar is employed, the solution acquires a reddish-brown colour, and during the evaporation a small quantity of carbonaceous matter is deposited; or if the liquor be evaporated to dryness, a brownish coloured salt is obtained: but it is not coloured if the acetic acid be employed. The filtering the evaporated fluid, or fusing the salt, or keeping it for a little time fluid, then dissolving it in water, and filtering it, frees it almost entirely from colour, and a light carbonaceous matter remains on the filter. The filtered solution is nearly limpid and colourless; and when again evaporated it forms a nearly colourless salt.[1] It is rendered still more colourless, if a portion of animal charcoal be added to the solution.[2] The salt of the present Pharmacopœia is free from odour.[3]

Qualities.—Acetate of potassa has a slight, peculiar odour, and a warm, sharp taste. It is usually in white masses, of a foliated, soft texture, shining, and becoming soon moist if exposed to the air. Exposure to a red heat converts it into carbonate of potassa. One fluid ounce of distilled water at 60° dissolves 504 grains; or 100 parts of it are soluble in 102 parts of water, and in twice its weight of alcohol. It is sometimes adulterated with tartrate of potassa, which may be detected by adding to a solution of the salt a solution of acidulated acetate of lead: a precipitate will fall soluble in acetic acid. Sulphates are detected by adding a solution of acetate of baryta; and hydrochlorates, by adding nitrate of silver. In the watery solution it is spontaneously decomposed; and is

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1 A very pure and beautiful salt, but too expensive for common use, may be prepared by adding to a solution of two parts of acetate of lead, a solution of one part of carbonate of potassa, and after filtering the liquor, adding to it a small portion of sulphate of potassa, and filtering again before evaporation. Vide *Journ. de Pharm.* Mai, 1818. p. 203.

2 *Ann. de Chim.* vol. lxxxvi. p. 44.

3 This salt was first described by Raym. Lully, and has been known by a great variety of names; as, for instance, *arcanum tartari*, *secret foliated earth of tartar*, *essential salt of wine*, *regenerated tartar*, *diuretic salt*, and *digestive salt of Silvius*.

also decomposed by the strong acids; by a decoction of tamarinds; the sulphates of soda and of magnesia; the hydrochlorate of ammonia; the tartrate of potassa and soda; and by solutions of bichloride of mercury, and of the nitrate of silver; which consequently cannot enter into formulæ with it.

Its constituents are 51·5 of acetic acid + 48·5 of potassa in 100 parts; or 1 eq. of acetic acid = 51·48 + 1 potassa = 47·15; 2 eq. of water, makes the equivalent = 116·63.

Medical properties and uses.—Acetate of potassa is mildly cathartic and diuretic. It is found to be occasionally beneficial in febrile affections and jaundice; but its principle use is in dropsies, and other diseases in which a copious discharge of urine is required. The manner in which this is effected is endeavoured to be explained by Dr. Paris, by assuming as a fact, that the stomach possesses "the power of readily decomposing all saline compounds, into which vegetable acids enter as ingredients, and of eliminating their alkaline base, which being in the course of the circulation carried to the kidneys, excites them into action, and promotes the excretion of urine."[1] But there are many objections to this theory. To produce its diuretic effect, the dose is from ℈j. to ʒj., given every three or four hours, in any bland fluid, or united with infusions of any of the lighter vegetable bitters, such as quassia or gentian. Doses of ʒij. or ʒiij. open the bowels.

Officinal preparations.—*Acetas Hydrargyri,* E. D. *Tinctura Acetatis Ferri,* D. *Acidum Aceticum,* D. E.

POTASSÆ CARBONAS, Lond. *Carbonate of Potassa.*[2]

"Take of impure carbonate of potassa, *two pounds;* water, *one pint and a half.* Dissolve the impure potassa in the distilled water, and filter; then pour the solution into a suitable vessel, and evaporate the water that the liquor may thicken; then stir assiduously with a spatula, until the salt concretes."

"A purer carbonate of potassa may be prepared from the crystals of bicarbonate of potassa heated to redness."

SUBCARBONAS POTASSÆ, Edin. *Subcarbonate of Potassa.*

"Let impure carbonate of potassa be put into a crucible, and exposed to a red heat; then triturate it with an equal weight of water. Pour the solution, after the impurities have subsided, into a clean iron pot, and boil it to dryness; stirring the salt constantly towards the end of the boiling, to prevent it from adhering to the vessel."

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1 *Pharmacologia.*

2 Kali præparatum, P. L. 1787. *Potassæ Subcarbonas, P. Tr.* 1824.

POTASSÆ CARBONAS E LIXIVE CINERE, Dub. *Carbonate of Potassa from Pearl-ashes.*

"Take of potashes coarsely powdered, cold water, each *one part*. Mix them by trituration, and macerate them in a wide vessel for the space of a week, with frequent agitation; then filter the solution, and evaporate it to dryness; and towards the end of the process assiduously stir the saline mass with an iron spatula. In this manner having reduced it to a coarse powder, preserve it in well-stopped vessels. Previous to dissolving the ashes in the water, if they be very impure, roast them in a crucible until they become white."

Syn. Soucarbonate de Potasse (*F.*), Kohlensaures Kali (*G.*), Unvollmaakle Kohlenstoffzuure Potasch (*Dutch*), Sotto-carbonato di Potassa (*I.*).

The potash, or pearl-ash of commerce, is a heterogeneous mass, consisting chiefly of carbonate of potassa, with small portions of sulphate of potassa, hydrochlorate of potassa, silicious earth, oxide of iron, and oxide of manganese, in various proportions. (See Part ii.) The above processes are intended to separate the carbonate of potassa in as pure a state as possible; and by following the directions of any of the Pharmacopœias, it is obtained sufficiently pure for medicinal purposes; while the insoluble metallic salts, and the greater part of the silicious earth, are left on the filter when the solution is strained. The present process is improved by cold instead of boiling distilled water being used.

Qualities. — The salt obtained by the above processes is really a carbonate, being composed of one atom of each of its components. In its dry state it consists of carbonic acid 31·43, potassa 68·57, in 100 parts, or of 1 eq. of potassa = 47·15 + 1 of carbonic acid = 22·12, making the equivalent 69·27; but as a hydrate, the state in which it usually exists, it contains 16 per cent. of water. It is in coarse white grains, which are so deliquescent, that they soon attract from the air as much water as dissolves them, forming a fluid of the consistence of oil: thence the salt must be kept in well-stopped bottles. Its taste is acrid and urinous: it changes to green the vegetable blue and red colours, combines with oils, and forms soaps, and is decomposed by acids with effervescence.[1] It does not decompose tartrate of iron, with which it may be, therefore, ordered in prescriptions.

SUBCARBONAS POTASSÆ PURISSIMUS. Edin. *Pure Subcarbonate of Potassa.*

"Take of impure supertartrate of potassa, *any quantity*. Wrap it up in moist bibulous paper, or put it into a crucible; and, having placed it among live coals, let it be burnt to a

[1] *Nicholson's Journal,* 4to. iii. 215.

black mass; which, after having reduced it to powder, expose in an open crucible to a moderate fire, until it become white, or at least ash-coloured, taking care that it be not melted. Then dissolve it in warm water; strain the solution through a linen cloth, and evaporate it in a clean iron vessel, stirring constantly towards the end of the process with an iron spoon, lest any of it should adhere to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, till the bottom of the vessel become red-hot. Finally, when it is cold, let it be preserved in well-stopped glass vessels."

POTASSÆ CARBONAS E TARTARI CRYSTALLIS, Dub. *Carbonate of Potassa from Crystals of Tartar.*

"Take of crystals of tartar, *any quantity.* Heat it to redness in a silver crucible lightly covered, until fumes cease to be emitted. Let the residue be reduced to a coarse powder, and in the same crucible, left uncovered, roast it for two hours, stirring it frequently. Then boil it in twice its weight of water, during a quarter of an hour; and after due subsidence of the impurities, pour off the pure solution. Let this part of the process be three times repeated. Filter the mixed leys, and evaporate them in a silver vessel; then, while the residuary salt is drying, granulate it by brisk agitation, and expose it to an obscure red heat. Take it out of the vessel before it be quite cold, and let it be preserved in well-stopped vials."

Syn. Soucarbonate de Potasse (*F.*), Sotto-carbonato di Potassa (*I.*).

The product of all of these processes is a carbonate of potassa. The degree of heat to which the crude bitartrate is exposed decomposes its tartaric acid; and by the re-union of two of its components, oxygen and carbon, carbonic acid is formed, which combines with the potassa, while the remaining carbonaceous matter produced by the decomposition is burnt out by the subsequent roasting. The resulting saline mass, besides carbonate of potassa, contains also a small portion of carbonate of lime and some argil, which, however, are separated by the solution and filtration.

Qualities. — These are in every respect the same as those of the salt obtained from the potashes of commerce; it, however, contains fewer impurities. Its constituents, according to Berard, are 29·79 acid, and 70·21 alkali in water, in 100 parts.[1] When well prepared, its constituents are, 1 eq. of carbonic acid $=22·12+1$ potassa $=47·15+2$ water $=18=87·27$. $(\dot{K}+\ddot{C}+\dot{H}^2)$.

Carbonate of potassa is often adulterated, or very carelessly

[1] *Annales de Chimie*, lxxi. 55.

prepared. If one part of it be dissolved in eight parts of distilled water, and saturated with pure nitric acid, the presence of silicious earth will be indicated by the solution becoming turbid; and, by weighing the precipitate, its quantity may be ascertained. A precipitate being formed on the addition of chloride of barium, indicates the presence of sulphates; a white precipitate turning bluish on exposure to the light, on adding nitrate of silver, proves the presence of hydrochlorates; calcareous earth is rendered evident by dropping into a solution a few drops of a solution of oxalic acid or oxalate of ammonia; and silica by heating the saturated hydrochlorate to redness, and lixiviating: the silica remains undissolved. It is incompatible with acids and acidulous salts, hydrochlorate of ammonia, acetate of ammonia, sulphates, the salts of calcium, lime-water, and metallic salts.

Medical properties and uses. — Carbonate of potassa is deobstruent, diuretic, and antacid. In small doses, it is sometimes given in cases of glandular obstructions of the abdominal viscera, particularly hepatic obstructions, with seeming advantage; but it is not certain that the benefit does not arise from the effects of the remedy in correcting acidity of the primæ viæ. As an antacid it is useful in dyspepsia and gout. Its effects on the kidneys are considerable, when aided by plentiful dilution, and it passes through these organs without being decomposed. The dose as an antacid is from gr. x. to ʒss. The principal use, however, of this salt in medicine is for the formation of saline draughts, for which purpose it is given in combination with a solution of the citric acid, or with recent lemon juice, in the proportion of ℈j. of the salt of f ʒ iv. of the lemon juice, or of an acid solution, containing gr. xviii. of citric acid, in febrile affections. When given as an antacid, its taste and acrimony are most perfectly covered by milk.

Officinal preparations. — *Aqua Supercarbonatis Potassæ*, E. *Potassæ Acetas*, L. E. D. *Potassæ Carbonas*, L. *Potassæ Tartras*, L. E. D. *Liquor Potassæ*, L. E. D. *Liquor Potassæ Carbonatis*, L. D. *Sulphas Potassæ*, E. *Magnesiæ Carbonas*, L. D. *Potassæ Sulphuretum*, L. E. D. *Mistura Ferri composita*, L. *Pilulæ Ferri compositæ*, L. *Liquor Potassæ arsenitis*, L. *Sulphur antimoniatum fuscum*, D. *Alcohol*, L.

POTASSÆ BICARBONAS, Lond. *Bicarbonate of Potassa.*

" Take of carbonate of potassa, *six pounds;* distilled water, *one gallon.* Dissolve the carbonate of potassa in the water, and afterwards pass through the solution carbonic acid until it is saturated. Apply a single heat, so that any crystals which form may be redissolved. Then set aside this solution that crystals may again form. Decant the fluid, and dry them.

"Carbonic acid is easily obtained from powdered chalk, mixed with water to the consistence of a syrup, and sulphuric acid, diluted with an equal weight of water, poured over it.

CARBONAS POTASSÆ, Edin. *Carbonate of Potassa.*

"Take of pure subcarbonate of potassa, *two parts;* water, *three parts.* Dissolve the salt in the water, and by means of a proper apparatus, throw into it a stream of carbonic acid gas. Filter the solution when it ceases to absorb the acid, and then evaporate it by a heat not exceeding 180°, that crystals may form. The carbonic acid is easily obtained by pouring diluted sulphuric acid on pulverized carbonate of lime."

POTASSÆ BICARBONAS, Dub. *Bicarbonate of Potassa.*

"Take of carbonate of potassa from lixiviated potashes, *one part;* distilled water, *two parts;* dissolve.

"Expose the solution, in a proper apparatus, to a stream of carbonic acid gas evolved from white marble by diluted hydrochloric acid, until the fluid become turbid; then strain, and afterwards expose it to the stream of carbonic acid gas until the alkali be saturated; finally, place the solution in a cool place, that crystals may form; dry these without heat, and preserve them in well-stopped bottles."

Syn. Carbonate de Potasse (*F.*), Kohlensaures Kali (*G.*), Koolenzuure Potasch (*Dutch*), Carbonato di Potassa (*I.*).

By these processes a pure and completely neutralized bicarbonate of potassa is obtained; and any silex the carbonate may have contained is completely separated. The present formula of the London College is a supposed improvement on the last, which directed this salt to be prepared by heating a mixed solution of five parts of carbonate of potassa and three parts carbonate of ammonia, so as to drive off the ammonia produced by the decomposition of the carbonate in a gaseous form. The present involves some objections. Thus, by using sulphuric acid to evolve the carbonic acid from the chalk, the sulphate of lime which is formed envelopes a portion of the carbonate, and prevents its decomposition, which is not the case if hydrochloric acid be employed.[1]

Qualities. — This salt, prepared by these formulæ, is inodorous, has a slightly alkaline taste, without any acrimony, and scarcely acts upon turmeric paper. It is in small eight oblique-angled prisms, of a beautiful white colour, which are not altered by exposure to the air; are soluble in four parts of water, at 60°, and $\frac{5}{6}$ths of their weight of boiling water, in which they are partially decomposed, carbonic acid gas being emitted during the solution. It is insoluble in alcohol. Its

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[1] This bicarbonate was first prepared by Cartheuser in 1752.

spec. grav. is 2·012, and its constituents, according to Pelletier, are 43 acid, 41 of alkali, and 16 of water — in 100 parts[1]; but according to Mr. Phillips, of carbonic acid 43·56, potassa 47·53, and water 8·91,[1] or of 2 eq. of carbonic acid = 44·24 + 1 potassa = 47·15 + 1 water = 9, making the equivalent 100·39 ($\dot{K}+2\dot{C}$). It is incompatible in formulæ with the acidulous salts, borax, hydrochlorate of ammonia, alum, sulphate of magnesia, lime-water, and all the metallic salts. Mr. Phillips remarks, that calomel, unless heat be applied, is not decomposed by it.

Medical properties and uses. — On account of the increased quantity of carbonic acid which this salt contains, it is preferable to the common carbonate for effervescing draughts, but ℈j. requires for saturation only grs. 15 of citric acid, or ℥ii[i] ss. of lemon-juice: but does not differ from it in properties as a remedy. The dose is from grs. x. to ℨj.

LIQUOR POTASSÆ EFFERVESCENS, Lond.
Effervescing Solution of Potassa.

"Take of bicarbonate of potassa, *one drachm;* of distilled water, *one pint.* Dissolve the bicarbonate of potassa in the water; and pass into the solution, under pressure, more carbonic acid than is sufficient for saturating it. Keep the solution in a well-stopped vessel."

AQUA SUPERCARBONATIS POTASSÆ, Edin.
Water of Supercarbonate of Potassa.

"Take of water, *ten pounds;* pure subcarbonate of potassa, *one ounce.* Dissolve, and expose the solution to a current of carbonic acid gas, arising from carbonate of lime in powder, *three ounces;* sulphuric acid, *three ounces;* and water, *three pounds;* gradually and cautiously mixed. The chymical apparatus of Dr. Nooth is well adapted for this preparation. But if a larger quantity of the solution be required, an apparatus which will admit of a sufficiently great pressure should be employed. The solution must be preserved in well-stopped vessels."

This solution is seldom sufficiently impregnated with the acid when made on a small scale; but in the great way, and with an apparatus from which a much greater pressure is obtained, a solution is prepared for sale, which contains a very large quantity of uncombined carbonic acid.

Qualities. — When properly prepared, it has a pungent, acidulous taste, and reddens tincture of litmus; is perfectly transparent, sparkles when poured into a glass, and effervesces violently with all the acids.

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[1] *Annales de Chimie*, t. xv. p. 33.

Medical properties and uses.—This solution of the acidulous bicarbonate is tonic and diuretic. It has also been regarded as lithontriptic, and is much used in calculous cases; but its properties as a solvent of calculi, if it possess any, must depend upon the potassa it contains, and, thence, the more completely it is impregnated with carbonic acid, the more its lithontriptic powers must be diminished. There is, however, reason for believing that even pure potassa when taken into the stomach exerts no influence on ready-formed calculi, and consequently its operation, even as a palliative or preventive, is confined to the stomach, where it neutralizes the acid that always prevails there in calculous affections, and relieves many of the uneasy symptoms it occasions. In this view the solution of the acidulous bicarbonate is a grateful mode of exhibiting potassa, as its acrimony is destroyed by its combination with the acid, which is nevertheless so weak as not to interfere with its operation as an alkali. On the same principles it proves beneficial in dyspepsia and gout, and forms with lemon-juice an effervescing draught still preferable to that prepared with the bicarbonate. The dose in calculous affections is f ℥ viij. taken three or four times a day.

POTASSII BROMIDUM, Lond. *Bromide of Potassium.*

"Take of bromine, *two ounces;* carbonate of potassa, *two ounces and a drachm;* filings of iron, *one ounce;* distilled water, *three pints.* Add first the iron, and afterwards the bromine, to a pint and a half of the distilled water. Set aside the mixture for half an hour, frequently stirring it with a spatula. Apply to it a gentle heat, and when a greenish colour appears, add the carbonate of potassa dissolved in the remainder of the water. Strain and wash the residue with two pints of boiling distilled water, and again strain. Evaporate the mixed solutions, that crystals may be formed."

This process comprehends two distinct stages: *first,* the combination of the bromine with the iron, which readily takes place at a slightly elevated temperature; *secondly,* the decomposition of the bromide of iron by the potassa. In this stage of the process, the oxygen of the potassa unites with the iron, and converts it into a protoxide which readily combines with the carbonic acid, also separated from the potassa, and forms a carbonate of iron, which, being insoluble, falls to the bottom of the vessel, whilst the bromide of potassium, produced by the union of the free bromine with the potassium, remains in solution. It readily crystallizes by evaporation.

Qualities.—Bromide of potassium is a white, inodorous, cubical salt, in quadrangular prismatic crystals, which decrepitate: it is very soluble in water, but only slightly so in alcohol. It consists of 66·1 parts of bromine + 33·9 of potassium, in 100 parts, or of 1 eq. of bromine = 78·4 + 1 of potassium = 39·15; making the equivalent = 117·55. It is incompatible with acids, metallic salts, and chlorine.

Medical properties and uses.—This bromide is stimulant and powerfully deobstruent, acting on the glandular system in the same manner as the iodide of potassium. It has been much employed on the Continent, especially by Majendie, and in this country by Dr. Williams of St. Thomas's Hospital, in enlargement of the spleen. It is said that, after ascertaining the extent of the enlargement by percussion, and marking it on the skin with ink, the daily diminution may be readily observed. I have found it servicable in improving the secretion of the liver. The dose is from gr. iij. to gr. x. twice or thrice a day.

POTASSII IODIDUM, Lond. *Iodide of Potassium.*

"Take of iodine, *six ounces;* carbonate of potassa, *four ounces;* iron filings, *two ounces;* distilled water, *six pints.* Put the iodine into four pints of the water, and add to it the iron, now and then stirring with a spatula for half an hour. Apply a gentle heat; and when the mixture acquires a greenish colour, add to it the carbonate of potassa dissolved in two pints of water, and filter. Wash the residue in two pints of boiling distilled water, and again filter. Evaporate the mixed solutions, that crystals may be formed."

In this process, the same changes, which I have described as occurring in the process for the bromide of potassium, take place.

POTASSÆ HYDRIODAS, Dub. *Hydriodate of Potassa.*

"Take of iodine, *one part;* sulphuret of iron rubbed into coarse powder, *five parts;* sulphuric acid, *seven parts;* distilled water, *forty-eight parts;* solution of carbonate of potassa, *a sufficient quantity;* rectified spirit, *six parts.* Mix by rubbing the iodine with sixteen parts of water, and put the mixture into a glass vessel. The sulphuret being put into the matrass, pour over it the acid previously diluted with thirty-two parts of water; and a tube being adapted to the neck of the matrass, and dipping to the bottom of the vessel containing the iodine and water, pass the gas through the mixture until the iodine disappear. Evaporate the filtered solution with a high temperature, and again filter. Then add, gradually, the solution of carbonate of potassa to saturate the acid, which is known by the effervescence ceasing. Let the mixture be set aside in a warm place until a dry residuary salt of a white colour be obtained; on this pour the spirit, and dissolve with heat. Finally, pour off the liquor from the salt, evaporate to dryness, and preserve the residue in a close vessel."

This salt, correctly speaking, is the iodide of potassium, and only becomes a hydriodate when it is dissolved in water. In the above process the hydrogen of the sulphureted hydrogen unites with the iodine and forms hydriodic acid, which, when saturated with the potassa of the carbonate, forms a hydriodate. When the subsequent steps of the process are followed, the hydrogen is extricated by uniting with the oxygen of the base, and the iodine remains in combination with potassium, forming an iodide.

Qualities.—Iodide of potassium is obtained in white cubical crystals, inodorous, and having a penetrating, slightly bitter taste; it is deliquescent, and very soluble, 136 parts requiring only 100 of water at 60°; during solution, a portion of water is decomposed, and the iodide is changed into hydriodate of potassa. The iodide is a compound of 1 prop. of iodine = 126·3 + 1 of potassium = 39·15, making the equivalent of the salt 165·45.

Medical properties and uses.—The iodide is seldom or never employed except to form the solution of the hydriodate, which is used for the same purposes as iodine; and also as the medium of holding the latter substance in solution. Of a solution consisting of thirty-six grains in a fluid ounce of water, the dose at first should not exceed ♏ x., but it may be gradually increased to ♏ lx., three times a day.

Officinal preparation.—*Unguentum Potassæ Hydriodatis,* D.

POTASSÆ SULPHAS, Lond. *Sulphate of Potassa.*[1]

"Take of the salt which remains after the distillation of nitric acid, *two pounds;* boiling water, *two gallons.* Ignite the salt in a crucible until the excess of sulphuric acid is entirely expelled, then boil it in the two gallons of water till a pellicle floats, and after filtering the liquor set it aside to crystallize. Pour off the water, and dry the crystals."

SULPHAS POTASSÆ, Edin. *Sulphate of Potassa.*

"Dissolve the acidulous salt, which remains after the distillation of nitrous acid, in hot water, and add as much carbonate of lime in powder as will saturate the superfluous acid, and leave the whole at rest, until the fæces subside. Having poured off the fluid, filter it through paper, and evaporate until crystals form."

SULPHAS POTASSÆ, Dub. *Sulphate of Potassa.*

"Dissolve the salt which remains after the distillation of

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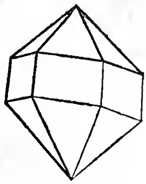
[1] This name was imposed by the French chymists in 1787. The following are some of its old names: *nitrum fixum, arcanum duplicatum, sal de duobus, sal polychrestus, tartarum vitriolatum, kali vitriolatum.*

nitric acid in a sufficient quantity of warm water. Add as much common carbonate of potassa as will saturate the superfluous acid. Let the filtered solution be evaporated with heat, that crystals may be formed."

Syn. Sulphate de Potasse (*F.*), Schwefelsaures Kali Vitriolweinstein (*G.*), Zwavelzuures Kali (*Dutch*), Solfato di Potassa (*I.*).

The London College has much improved the process for making this salt, as far as refers to economy. In the Edinburgh process, the carbonate of lime, which is added to the solution of the salt, combines with the superfluous sulphuric acid, while the carbonic acid is expelled; and the residue is thus converted into sulphate of potassa. The Dublin formula is objectionable on the score of expense; the value of the salt, at the price of the pure salt made on the large scale, being to its cost very nearly as 5 to 10.[1] The greater part of the sulphate of commerce is prepared from the residue of the distillation of nitrous acid from nitre and sulphate of iron. This is a mixture of sulphate of potassa and red oxide of iron, from which the sulphate is easily separated by boiling water, while the oxide remains undissolved.[2]

Qualities. — Sulphate of potassa has a naseous, bitterish taste. It is usually procured in small, grouped, transparent crystals, of which the form is a pyramidal dodecahedron with isoceles triangular faces; but this form is subject to various modifications, according to the mode of conducting the evaporation.[3] Their specific gravity is 2·4073.[4] The crystals are not efflorescent; they decrepitate when heated; and are soluble in 17 parts of water at 60° and 5 parts of boiling water. The salt is decomposed by tartaric acid, by chloride of barium, chloride of calcium, bichloride of mercury, nitrate of silver, and acetate and diacetate of lead, which therefore cannot enter into formulæ with it. Charcoal also decomposes it at a high temperature. Its constituents, according to the analyses of Mr. Phillips[5], are 45·45 of acid, 54·55 of alkali; that of Berzelius, 47·1 of acid, and 52·9 of alkali; and that of Berard, 42·76 of acid, and 57·24 of alkali[6], or of 1 eq. of potassa = 47·15 + 1 of sulphuric acid = 40·1, making the equivalent 87·25.



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[1] Vide *London Medical Review*, April, 1810, p. 135.

[2] This oxide, when dried, is of a deep red colour, and is the *colcothar* of commerce.

[3] When a tepid solution of sulphate of potassa is in the act of crystallizing, light is evolved.

[4] Hassenfratz, *Ann. de Chimie*, xxviii. 12.

[5] *System of Chymistry*, 4th edit. ii. 660.

[6] *Annales de Chimie*, lxxi. 47.

Medical properties and uses. — This salt is deobstruent and cathartic. It is given with great advantage in the visceral obstructions to which children are liable; and, in combination with rhubarb or with aloes, I have found it more useful than any of the other saline purgatives, in jaundice and dyspeptic affections. On account of its sparing solubility, it is generally given in the form of powder, in doses of from grs. x. to ʒj. according as it is intended to act as a deobstruent or a purgative.

Officinal preparation.—*Pulvis Ipecacuanhæ compositus,* L. E. D.

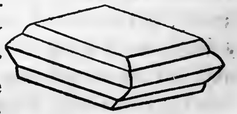
POTASSÆ BISULPHAS, Lond. *Bisulphate of Potassa.*

"Take of the salt which remains after the distillation of the nitric acid, *two pounds;* sulphuric acid, *one pound;* boiling water, *six pints.* Dissolve the salt in the water, and add the acid to it, and mix. Lastly, boil the solution, and set it aside to crystallize."

POTASSÆ BISULPHAS, Dub. *Bisulphate of Potassa.*

"Take of the sulphuric acid of commerce, *two parts;* common carbonate of potassa, *a sufficient quantity;* water, *six parts.* Mix one part of the sulphuric acid with the water, and saturate it with the carbonate of potassa; then add the other part of the sulphuric acid, and evaporate the fluid until crystals form on cooling."

This salt is the *sal enixum* of commerce. The solution should not be filtered until it be cold, as a copious deposition of uncrystallized salt takes place when it is filtered while hot. When it is dissolved in water, and allowed to crystallize, it is often converted into sulphate and sesquisulphate of potassa, on which account the London College has ordered the addition of the sulphuric acid.



Qualities.—Its crystals, which are rhombic prisms, impress a sour and slightly bitter taste; and contain from 12 to 13 per cent. of water. It reddens the vegetable blues; is soluble in two parts of water at 60°; in less than an equal weight of boiling water; and effervesces with the carbonates of alkalies. The proportions of its constituents are stated to be, of potassa 32·87, acid 54·80, and water 12·33, in 100 parts; or 2 eq. of sulphuric acid = 80·2 + 1 of potassa = 47·15 + 2 water = 18, making the equivalent 145·55. When exposed to a red heat, the water of crystallization and half the acid are expelled, and simple sulphate of potassa remains.

Medical use. — As a remedy its efficacy is as yet unknown; but we are informed [1] that it has been introduced into the

[1] *Powel's Translation of the London Pharmacopœia,* 2d edit. 73.

Pharmacopœia from an idea that it will afford "a useful means of producing the effects of sulphuric acid combined with those of purgative salt; and that it may be exhibited at once in a solid form, an indication which is often desirable." Dr. Paris says[1], it forms a grateful adjunct to rhubarb. The dose is from grs. x. to ʒij. exhibited in combination with infusion of some bitter or rhubarb.

SULPHAS POTASSÆ CUM SULPHURE, Edin. *Sulphate of Potassa with Sulphur.*

"Take of nitrate of potassa in powder, and of sublimed sulphur, *equal weights.* Mix them well together, and throw the mixture in small quantities at a time into a red-hot crucible. The deflagration being finished, let the salt cool, and preserve it in a well-stopped glass vessel."

In this process the sulphur is oxidized, and converted partly into sulphuric acid, and partly into sulphurous acid, by uniting with the oxygen afforded by the decomposition of the nitric acid of the nitrate, which is effected by the degree of heat employed. During the deflagration, however, a part of the acid is volatilized in the form of nitrous oxide, and consequently the oxygen evolved is not sufficient to acidify all the sulphur, and the unaltered portion remains united with a portion of potassa. The sulphuric and sulphurous acids combine with the remainder of the potassa; and thence the product is a mingled mass, consisting of sulphate and bisulphate of potassa and sulphuret of potassa. It is the preparation which was originally known under the name of *sal polychrest.*

Qualities.—This salt has a sensibly acid taste, and reddens infusion of litmus. It is almost wholly dissolved in eight parts of water, at 60°; and by exposure to the air it is altogether converted into sulphate of potassa.

Medical properties and uses.—The same as those of sulphate of potassa; and consequently it is scarcely ever used. It passes through the kidneys undecomposed.

POTASSÆ TARTRAS, Lond. *Tartrate of Potassa.*

"Take of bitartrate of potassa, *three pounds;* carbonate of potassa, *sixteen ounces,* or *as much as may be sufficient;* boiling water, *six pints.* Dissolve the carbonate of potassa in the boiling water, and add the bitartrate of potassa, and boil. Filter the solution; and afterwards boil it down until a pellicle floats, and set it aside to crystallize. Having poured off the water from the crystals, dry them, and again evaporate that crystals may be produced."

TARTRAS POTASSÆ, Edin. *Tartrate of Potassa.*

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[1] *Pharmacologia.*

"Take of subcarbonate of potassa, *one part*: supertartrate of potassa, *three parts*, or *a sufficient quantity*; boiling water, *fifteen parts*. To the subcarbonate dissolved in the water add, in small portions, the supertartrate of potassa, reduced to a fine powder, as long as it excites effervescence, which gradually ceases before three times the weight of the subcarbonate of potassa be added; filter the solution when it is cold, and, after due evaporation, set it aside that crystals may form."

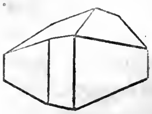
POTASSÆ TARTRAS, Dub. *Tartrate of Potassa.*

"Take of common carbonate, *five parts*; bitartrate of potassa, *fifteen parts*; boiling water, *forty-five parts*. To the carbonate of potassa, dissolved in the water, gradually add the bitartrate rubbed to a subtile powder; filter the solution through paper, evaporate, and set it aside that crystals may form as it cools."

Syn. Kali Tartarizatum, P. L. 1787. Tartrate de Potasse (*F.*), Weinsteinsaures Kali (*G.*), Tartrato di Potassa (*I.*).

In these processes the superabundant acid of the bitartrate of potassa is saturated by the potassa of the carbonate, the carbonic acid gas of which is expelled, and a neutral tartrate is obtained. The quantity of alkali required for this purpose must necessarily vary, owing to the degree of dryness of the carbonate employed. To obtain regular crystals, a very slow, nearly spontaneous evaporation is necessary; and, therefore, this salt, as found in the shops, and prepared on a large scale, is in the form of a white granular powder, which is produced by the evaporation being continued to dryness with frequent stirring.[1]

Qualities. — This salt has a bitterish, cool taste. The primary form of its crystal is a right oblique-angled prism,



(see figure); and in this state it is soluble in its own weight of water at 60°: but in the granular form, four parts of cold water are required for its solution. It is slightly deliquescent. When long kept in solution, its acid is decomposed, and its alkali remains in the state of a subcarbonate[2]: and the same circumstances occur when it is exposed to a red heat. Alcohol dissolves it readily. It is partially decomposed by the weaker acids and the acidulous salts; also by tamarinds, which convert it to the state of bitartrate; and it is completely decomposed by lime-water, chloride of barium, magnesia, nitrate of silver, and acetate and diacetate of lead. Its constituents, abstracting the water of crystallization, are, in 100 parts, 57·9

[1] It was formerly named *soluble tartar, sal vegitabile, tartarus tartarisatus.*

[2] *Murray's Chymistry*, 2d edit. iv. 329.

of acid, and 42·1 of alkali [1]; or 1 eq. of tartaric acid = 66·48 + 1 potassa = 47·15 = 113·63. As usually prepared, the crystals contain 1 eq. of the tartrate = 113·63 + 2 of water = 18 = 131·63.

Medical properties and uses. — Tartrate of potassa is a valuable purgative, operating mildly, without griping; and even correcting the griping properties of senna and the resinous purgatives, with which it is, therefore, usually combined. It enters into Klein's *Pulvis lenitivus hypochondriacus*, which consists of the following articles: — ℞ Flavédinis Corticis Aurantiæ, Radicis Rhei, Potassæ Tartratis, āā ʒ ss., Olei Cajeputi gutt. iij. M. ft. pulvis una pro dosi.[2] The dose of the tartrate is from ʒj. to ℥j. in solution.

LIQUOR POTASSII IODIDI COMPOSITUS. Lond. *Compound Solution of the Iodide of Potassium.*

"Take of the iodide of potassium, *ten grains;* of iodine, *five grains;* of distilled water, *one pint.* Mix that they may dissolve."

The object of this solution is evidently to enable a given quantity of water to take up a much larger proportion of iodine than it could otherwise do, as one grain of iodine requires fifteen ounces of distilled water for its solution.

Qualities. — The solution is of a brown colour, exhales the odour of iodine, impresses its taste, and displays the evidence of its being present in a free state by the blue colour produced by the solution in starch.

Medical properties and uses. — It is the mode of administering iodine suggested by Lugal; and it is both a convenient and a useful form of the medicine, in scrofulous affections and bronchocele. The dose is f ʒij. to f ʒvj.

In secondary syphilis, when what is termed mercurial cachexia displays itself, from the improper employment of mercurials, nothing proves more salutary than the iodide of potassium: it allays pain, restores the appetite, rouses the animal spirits, invigorates the body, and bestows flesh, in a few weeks, to an extent which seems almost miraculous.

POTASSII SULPHURETUM [3], Lond. *Sulphuret of Potassium.*

"Take of sulphur, *an ounce;* carbonate of potassa, *four ounces.* Rub them together, and place the mixture over the fire in a covered crucible until they unite."

SULPHURETUM POTASSÆ, Edin.

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[1] *Phillips's Trans. of the Pharmacopœia*, p. 56. 1837.
[2] Quoted by Brande, *Manual of Pharm.* p. 232.
[3] Kali sulphuratum, P. L. 1787.

"Take of subcarbonate of potassa, *two parts;* sublimed sulphur, *one part.* Rub them together, and put them into a large, covered crucible, to which, having adapted a cover, apply the fire cautiously, until they melt. Preserve the mass in a well-closed vessel."

SULPHURETUM POTASSÆ, Dub. *Sulphuret of Potassa.*

"Take of carbonate of potassa, *four parts;* sublimed sulphur, *one part.* Having mixed them together, put them into a crucible, and having adapted to it a cover, expose it to a fire gradually raised until they unite."

Syn. Sulphure de Potasse (*F.*), Schwelflichtes Kali (*G.*), Solfuro di Potassa (*I.*).

This sulphuret cannot be properly formed by following the directions of any of the Colleges: for, to render the action complete, it is necessary to expose the carbonate in a crucible to a red heat, previously to its being rubbed with the sulphur, in order to dissipate the water of the carbonate, and to expel a portion of the carbonic acid. When the fusion is effected, the mixture is to be poured upon a marble slab, and as soon as it concretes, the mass must be broken in pieces and instantly put into a closely-stopped bottle. In this process the potassa, after the carbonic acid is expelled, is partly decomposed, and the oxygen of that portion combining with a portion of the sulphur forms sulphuric acid, which combines with the undecomposed portion of the potassa, and forms sulphate of potassa. The remainder of the sulphur combines with the potassium and forms a sulphuret: thus making the result of the process a compound of one eq. of sulphate of potassa and three eq. of sulphuret of potassium.[1]

Qualities.—Well-prepared sulphuret of potassium, is inodorous while; dry but when moistened or dissolved in water, a partial decomposition of both the water and the sulphuret is effected, and sulphureted hydrogen is formed. It has an acrid, bitter taste; changes the vegetable blues to green; is hard, brittle, breaking with a glassy fracture, of a liver-brown colour, and stains the skin brown.[2] By exposure to the air it attracts moisture; its colour changes to a pale green; the fœtid odour noticed above is emitted; and it is gradually converted into sulphate of potassa. It is also decomposed by all the acids

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[1] A simple or monosulphuret is formed by decomposing sulphate of potassa by means of a high temperature, in a crucible lined with a charcoal lute, the vacant space being filled with charcoal rammed hard, and the cover luted on. The oxygen of both the potassa and of the sulphuric acid is carried off by the carbon, whilst the sulphur and the potassium remain in combination as a sulphuret.

[2] Hence its old name, *hepar sulphuris.*

which expel sulphureted hydrogen, and the sulphur is precipitated. In a violent heat the sulphur sublimes, leaving the potassa. The constituents of the sulphuret are 1 eq. of potassium = 39·15 + 1 of sulphur = 16·1; making the equivalent 55·25.

Medical properties and uses. — Sulphuret of potassium is expectorant and diaphoretic. It has been frequently given in chronic asthma and bronchitis, and in pertussis, without much benefit; but it has been found useful in arthritic, rheumatic, and herpetic affections; and in combination with conium as a palliative in cancerous cases.[1] It has also been employed in France, for the cure of scabies, in the form of a bath, or of an ointment made with one part of the sulphuret, sixteen of soap, and thirty-two of oil. From a theory founded on its chemical action on metallic salts out of the body, it has also been strongly recommended as an antidote against arsenical, saturnine, and mercurial preparations, when these have been taken in doses sufficient to produce deleterious effects; but as far as concerns arsenical poisons, it has been recommended on erroneous principles.

The usual dose is grs. v. or grs. viij., combined with soap, in the form of pills, for the first-mentioned cases; or from grs. v. to grs. x. as an adjunct to conium in cancer, given several times a day; or as an ointment, ʒj. to ℥j. of lard.

POTASSÆ[2] SULPHURETI AQUA, Dub. *Water of Sulphuret of Potassa.*

"Take of sublimed sulphur, *one part;* water of caustic potassa, *eleven parts.* Boil them together for ten minutes, and filter through paper. Preserve the preparation in well-stopped phials. The specific gravity of this liquor is, to that of distilled water, as 1117 to 1000."

Syn. Liquore di Solfuro di Potassa (*I.*).

The name given to this preparation conveys an erroneous idea of its nature. When an alkaline sulphuret is dissolved in water, changes exactly similar to those which take place during the solution of an earthy sulphuret occur, altering the character of the product; and as the same happen by the direct combination of sulphur with a liquid alkali, this preparation is not a simple aqueous solution of sulphuret of potassa, but, in fact, a solution of the metallic base of the alkali in sulphureted hydrogen, or a *hydrosulphuret of potassium.*

Qualities. — This solution has a slightly fœtid odour, and a nauseous, acrid, bitter taste. Its colour is reddish yellow,

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[1] *Pearson's Practical Synopsis, &c.* i. 283.
[2] It was formerly denominated *liquid hepar,* or *liquid liver of sulphur.*

approaching to deep orange; its feel soapy; and it stains the cuticle a greenish black. Acids decompose it, precipitating the sulphur, and disengaging a portion of sulphureted hydrogen gas; and it is also decomposed by exposure to the air, the oxygen of which being absorbed by the sulphur forms sulphuric acid, which produces a sulphate with the potassa; so that in process of time the whole is changed into a solution of sulphate of potassa. Hence the necessity of preserving it in well-stopped phials."

Medical properties and uses. — This solution does not differ in its medicinal properties from the solid sulphuret of potassium. It is, however, chiefly employed as an external application; and as such has been found very beneficial in porrigo, scabies, and herpetic eruptions. When given internally, the dose is from ♏ xx. to ʒ iss. twice a day.

QUINÆ DISULPHAS, Lond. *Disulphate of Quina.*

"Take of bruised heart-leaved cinchona, *seven pounds;* sulphuric acid, *nine ounces;* purified animal charcoal, *two ounces;* hydrated oxide of lead, solution of ammonia, distilled water, of each, *as much as may be required.* Mix four ounces and two drachms of the acid with six gallons of distilled water, and add to them the cinchona; boil for an hour, and strain. In the same manner, boil the residue with the same quantity of acid and water for an hour, and strain. Finally, boil the cinchona for three hours in eight gallons of distilled water, and strain. Wash the residue frequently with fresh quantities of boiling distilled water. To the liquors mixed together add the oxide of lead, still moist, to saturation. Pour off the supernatant fluid, and wash the precipitate with distilled water. Boil down the liquors (including the washings) for a quarter of an hour, and strain: then gradually add solution of ammonia to precipitate the quina. Wash this until no alkali be perceptible. Let the residue be then saturated with sulphuric acid diluted. Afterwards digest with two ounces of animal charcoal, and strain. Finally, all the charcoal being washed, evaporate carefully the liquor that crystals may form."

In this process, the kinate of quina is taken up more readily by the acidulated water than it would be by simple distilled water. The addition of the hydrated oxide of lead frees the quina from the sulphuric acid, which is precipitated in the form of sulphate of lead, leaving the kinate of quina in solution. The ammonia abstracts the kinic acid and forms with it a soluble kinate of ammonia, whilst the freed quina, being little soluble, is thrown down. The disulphate is the result of the addition of the acid to this precipitate; it is freed from the colouring matter by digestion with the animal charcoal. The salt readily crystallizes. The quantity of the disulphate obtained is very variable: it is mixed with a small proportion of disulphate of cinchonia.

This salt is chiefly manufactured in Paris, whence, Dumas informs us, 120,000 ounces are annually exported. It is frequently adulterated either with sugar, or gum, or starch, or sulphate of lime, or acetate of lime. The sugar is readily detected by dissolving the suspected salt in water, and precipitating the quina by liquor potassæ; as this destroys the bitterness of the solution, the presence of the sugar becomes obvious by its taste. Gum and starch are detected by digesting the salt in strong alcohol: the disulphate is dissolved and the impurities are left. The sulphate and acetate of lime are detected by exposing the suspected salt to a strong heat; the disulphate of quina is totally consumed, whilst the lime of the adulterating salts remain.

Qualities. — The disulphate of quina crystallizes in delicate acicular crystals, inodorous, and impressing a bitter taste on the palate. They require for their solution 740 parts of water at 60°, and 30 parts at 212°: but 80 parts only of cold alcohol of sp. gr. 850. They dissolve freely in alcohol at 212°: and effloresce when exposed to dry or heated air. The constituents of the salt are 2 eq. of quina = 329·1 + 1 of acid = 40·1 + 10 eq. of water = 90; making the equivalent 529·2: or of 74·31 parts of quina + 9·17 of acid + 16·52 of water in 100 parts.

Disulphate of quina is incompatible in prescriptions with alkalies and their carbonates, lime-water, chloride of calcium, the salts of baryta, those of the oxide of lead, and astringent vegetable infusions and decoctions. It may be administered with sulphate of iron, and all the sulphates, and with acetate and hydrochlorate of morphia.

Medical properties and uses. — Disulphate of quina is a stimulant, tonic, and antiperiodic. It excites the tissues to which it is applied, and being taken into the circulation, augments the vigour and regulates the action of the heart and arterial system. Owing to its topical influence, in irritable states of the mucous membrane, and when over-dosed, it disorders the digestive organs, causing heat in the epigastrium, foul tongue, nausea and headach; and, in plethoric habits, hæmorrhages. In doses, not exceeding a grain, dissolved in f℥iss. of acidulated infusion of roses, or of the confection of roses, it is an excellent tonic in dyspeptic affections; and in doses of two grains to three grains given every second hour, in the intervals of the paroxysms of ague, it rapidly checks the progress of the disease.

Some practitioners administer from grs. viij. to grs. x. immediately before the accession of the paroxysm; but my own experience is in favour of small doses at short intervals. M. Sadillot recommends it to be administered in the following form, in combination with opium: — Quinæ Disulphatis grs. xij.; Opii grs. iij.; Confect. Rosæ q. s. fiant pilulæ x.; one every hour or two in the intermission of ague. As a general tonic, when the mucous membrane is in an irritable condition, or when diarrhœa is present, the decoction of the bark is preferable to the disulphate of quina. The dose as a simple tonic is from gr. j. to grs. ij.; as an antiperiodic, from grs. ij. to grs. xij.

STRYCHNIA, Lond. *Strychnia.*

"Take of bruised nux vomica, *two pounds;* rectified spirit, *three gallons;* diluted sulphuric acid, magnesia, solution of ammonia, *of each, a sufficient quantity.* Boil the bruised nux vomica with a gallon of the spirit for an hour, in a retort, to which a receiver is adapted. Decant the liquor, and boil the residue again, and a third time, with another gallon of spirit and the spirit recently distilled, and pour off the liquor. Press the nux vomica, and the fluid obtained being mixed with the other liquors, distil the spirit. Evaporate the residue to the consistence of an extract. Dissolve this in cold water, and strain. Evaporate the solution, with a gentle heat, to the consistence of a syrup. Add to this, whilst it is hot, the magnesia, in small quantities at a time, to saturation, stirring them together. Set the mixture apart for two days, then decant the supernatant fluid. Press the residue in a linen cloth. Boil it in spirit, then strain and distil the spirit. Add to the residue a little diluted sulphuric acid mixed with water, and macerate with a gentle heat. Set it aside for twenty-four hours, that crystals may form. Press and dissolve them. Finally, to these, dissolved in water, add ammonia, stirring frequently to favour the precipitation of the strychnia. Afterwards dissolve these, and set the solution aside that crystals may be produced."

Strychnia and brucia exist in nux vomica in the form of igasurates; in the above process these salts are taken up by the alcohol. The addition of the cold water to the extract deprives it of a fatty matter: and the magnesia being added to the solution freed from this matter, decomposes the igasurate and leaves the strychnia, which is very insoluble, to precipitate. This precipitate is impure strychnia, and is readily taken up by the spirit; the residue, after the distillation of the spirit, being converted by the sulphuric acid into sulphate of strychnia: this salt is decomposed by the ammonia, which forms a soluble sulphate, and the strychnia is precipitated. The crystals formed in the alcoholic solution always contain some brucia, which, however, can be removed by maceration in diluted alcohol.

Qualities.—Strychnia crystallizes in minute quadrilateral crystals, inodorous, and impressing an excessively bitter taste upon the palate; so bitter indeed, as to communicate the taste to 600,000 times their weight of water. It requires 6000 parts of water at 60°, and 2500 parts at 212°, for solution. It is insoluble in very strong alcohol and in æther; but it dissolves readily in alcohol of a sp. gr. 850. It has a decided alkaline reaction, and forms neutral salts with the acids. Owing to the brucia which it generally contains, it strikes a blood red with nitric acid; but, when pure, it forms a pale straw-coloured solution. Its constituents are 180 parts of carbon, 16 of hydrogen, 24 of oxygen, and 14 of nitrogen, in 100 parts, or it consists of 30 eq. of carbon $= 183{\cdot}6 + 16$ of hydrogen $= 16 + 3$ of oxygen $= 24 + 1$ of nitrogen, $=$ 14·15, making the equivalent 237·75.

Medical properties and uses.—Strychnia is a tonic, a powerful excitant, and an acro-narcotic poison, operating specially upon the motor tract, and in a less degree upon the sensitive tract of the spinal cord. This is demonstrated by the fact that the division of the cord near the occiput, or even decapitation, does not interfere with its operation. In large doses, or in moderate doses long continued, it causes tetanic spasms, and such a rigidity of the respiratory muscles, as to produce fatal asphyxia; a property which has been taken advantage of to restore the nervous energy in paraplegia and partial paralysis, especially that caused by carbonate of lead. Its employment as a remedy in paraplegia was suggested by M. Fouquier, and its efficacy in this and other forms of palsy has been verified by Dr. Bardeley, Majendie, myself, and many others. Owing to the insolubility of strychnia, it is very uncertain in its operation; being either almost inert, or too active, according to the quantity of acid present in the stomach. I have, therefore, found it most efficacious when administered in the form of an acetate, which is readily formed by dissolving gr. j. of the alkali in f ʒj. of distilled vinegar; so that six minims contain one tenth of a grain of strychnia, the proper dose to commence with. In some habits I have seen one sixteenth of a grain produce tetanic twitchings; whilst in others I have given gr. iss. without the smallest obvious effect. As soon as the tetanic twitchings become so severe as to affect the breathing, the medicine should be discontinued, and after some days again recommenced in smaller doses, if it be necessary to persist in its use. In very minute doses, strychnia operates as a tonic, and has been beneficially employed in pyrosis, passive diarrhœa, and leucorrhœa.

I have employed strychnia sprinkled on blistered surfaces, with advantage, in incipient amaurosis depending on simple atony of the optic nerve, and in partial paralysis: half a grain mixed with grs. ijss. of refined sugar is a proper quantity in such cases.

VERATRIA, Lond. *Veratria.*

Take of sabadilla, bruised, *two pounds;* rectified spirit, *three gallons;* diluted sulphuric acid, solution of ammonia, purified animal charcoal, magnesia, *of each, a sufficient quantity.* Boil the sabadilla with a gallon of the spirit for an hour, in a retort with a receiver fitted to it. Decant the solution, and boil the residue with another gallon of the spirit and that which has distilled, and pour off the liquor. Let this be done a third time. Press the sabadilla, and distil the spirit from the liquors mixed and strained. Evaporate the residue to the consistence of an extract. Boil this three or more times in water acidulated with a little diluted sulphuric acid, and evaporate the strained liquor with a gentle heat to the consistence of syrup. To this, when it is cold, add magnesia to saturation, assiduously stirring; then press and wash. Let this be repeated two or three times; then dry the residue, and digest it two or three times in spirit, with a gentle heat, and strain as often. Afterwards distil the spirit. Boil what remains in water, acidulated with sulphuric acid, and with the addition of animal charcoal, for a quarter of an hour, and strain. Finally, the charcoal being well washed, evaporate the liquors carefully to the consistence of syrup, and add to them as much ammonia as will be sufficient for precipitating the veratria. Wash and dry it."

In this process, the gallate of veratria, which exists in the seeds of Sabadilla (Helonias *officinalis*), is taken up by the alcohol, aided by the sulphuric acid, which decomposes the gallate and forms a sulphate of veratria. This is decomposed by the magnesia, and the veratria is precipitated, freed in a great measure from the other substances with which it was combined. It is again converted into a sulphate, which is ultimately decomposed by the ammonia, and the veratria precipitates in a tolerably pure state.

Veratria was discovered by Pelletier and Caventou in 1819, and may, also, be procured from the roots of Veratrum *album.* It is supposed to be the active principle of colchicum; but, according to Geiger and Hesse, this is a mistake. These chymists assert that the alkali of colchicum is distinct from veratria in its solubility, its acrimony, and its poisonous influence, which is considerably less than that of veratria.[1]

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[1] *Journ. of Phil. Col. of Pharm.* vi. 320.

Couerbe supposes the Helonias contains also another alkali, which he has named sabadilline.

Qualities.—Veratria is a whitish, inodorous powder, impressing an acrid, burning taste on the palate. It is nearly insoluble in water at 60°, and requires for its solution more than 1000 parts of water at 212°. It is readily dissolved in alcohol, but less so in æther. It gives an alkaline reaction, and combines with the acids, forming salts which are not easily crystallized. The constituents of veratria are, 34 eq. of carbon $=208{\cdot}08+22$ of hydrogen $=22+1$ of nitrogen $=14{\cdot}15$ $+6$ of oxygen $=48$; making the equivalent $=292{\cdot}23$; or $70{\cdot}83$ parts of carbon $+\,7{\cdot}63$ of hydrogen $+\,4{\cdot}88$ of nitrogen $+\,16{\cdot}66$ of oxygen in 100 parts.

Medical properties and uses.—This alkali is a powerful topical excitant, but it is by no means certain that it is taken into the system. It is difficult to apportion the dose for internal administration, even when dissolved in alcohol; and as its chief influence is as a topical purgative, I do not perceive any advantage which it possesses over elaterium, which operates nearly in the same manner. As an external application it has been efficaciously employed by Majendie in France, and Dr. Turnbull in this country: but the extravagant eulogies of the latter have not tended to confirm the reputation of the remedy. From six to twelve grains dissolved in f℥j. of alcohol as a liniment, or 30 grs. mixed with ʒj. of olive oil and ℥j. of lard as an ointment, have been employed in neuralgia and other painful affections, and in gouty and rheumatic paralysis. If it be internally employed, the dose should not exceed one-twelth of a grain; and the action of even this minute dose should be watched.

PREPARATIONS OF SODA.

SODÆ ACETAS, Dub. *Acetate of Soda.*

"Take of carbonate of soda, *any quantity;* distilled vinegar, *enough to saturate the alkali.* Evaporate the filtered solution until it attain the sp. gr. 12·76. Crystals form as the solution cools; they must be cautiously dried, and preserved in closely-stopped bottles."

To obtain well-formed crystals the evaporation should be conducted in a gentle heat: and, if they be not quite pure, they should be redissolved, and treated with pure animal charcoal.

Qualities.—This salt has an acerb, bitter taste: is soluble in three parts of water at 60°; does not deliquesce, but loses its water of crystallization in a moderate temperature; in a greater heat, 600° Fahr., it is decomposed, and leaves as a residue carbonate of soda. Acetate of soda crystallizes in solid striated oblique rhombic prisms. It consists of 1 eq. of soda = 31·3 + 1 of acetic acid = 51·48; making the equivalent 82·78.

Medical properties and uses. — Acetate of soda is diuretic, and may be used in the same cases as acetate of potassa, over which it possesses no advantages.

SODÆ SESQUICARBONAS, Lond. *Sesquicarbonate of Soda.*

"Take of carbonate of soda, *seven pounds;* distilled water, *a gallon.* Dissolve the carbonate of soda in the water, and strain. Then transmit carbonic acid through the solution, to perfect saturation, that the salt may subside. Dry the crystals, involved and pressed in linen cloth, with a gentle heat.

CARBONAS SODÆ, Edin. *Carbonate of Soda.*

"Take of subcarbonate of soda, *two parts;* water, *three parts.* Dissolve the salt in the water, and subject it to a stream of carbonic acid gas, until the acid be no longer absorbed. Then filter the fluid, and evaporate it in a heat not exceeding 180°, that it may crystallize. The carbonic acid is easily obtained from equal weights of pulverized carbonate of lime and of sulphuric acid largely diluted with water."

SODÆ BICARBONAS, Dub. *Bicarbonate of Soda.*

"Take of carbonate of soda, *two parts;* water, *five parts.* Dissolve; and, by means of a proper apparatus, transmit through the solution a stream of carbonic acid gas, extricated from white marble by means of diluted muriatic acid, until crystals are formed: then, with a heat not exceeding 120°, evaporate the fluid to obtain more crystals, which, being united with the former, are to be dried, and preserved in well-stopped bottles.

Syn. Carbonate de Soude (*F.*), Kohlensaures Natrum (*G.*), Koolenzuure Soda (*Dutch*), Carbonato di Soda (*I.*).

The constituents of this salt, which is a sesquicarbonate, are, according to Rose, 49·05 of acid, 29·95 of alkali, and 20·20 of water, in 100 parts: in its crystalline state, of 3 eq. of carbonic acid = 66·36 + 1 of soda = 31·3 + 2 of water = 18 = 115·66.[1]

Qualities. — This salt is procured in very white minute crystals, without any alkaline taste. It is partially decomposed in moderate heat, 212° Fahr., and is soluble in ten parts of water at 60°. It readily loses its carbonic acid. It is not incompatible in prescriptions with sulphate of magnesia.

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1. This salt occurs native in Africa and in South America.

Medical properties and uses. — This salt does not appear to possess any advantages over the carbonate as a remedy, but it is less nauseous. The dose is from grs. x. to ʒss.

PHOSPHAS SODÆ, Edin. *Phosphate of Soda.*

"Take of bones, burnt to whiteness and reduced to powder, *ten pounds;* sulphuric acid, *six pounds;* subcarbonate of soda, *a sufficient quantity.* Mix the powdered bones with the sulphuric acid in an earthen vessel; then add nine pounds of water, and again mix: keep the vessel in a vapour bath for three days; after which, dilute the matter with nine pounds more of boiling water, and strain through a strong linen cloth, pouring boiling water gradually over it, until the whole of the phosphoric acid be washed out. Set the strained liquor apart, that the impurities may subside, from which pour it off, and evaporate it to nine pounds. To this liquor, separated from its impurities, and heated in an earthen vessel, add a warm solution of subcarbonate of soda, until the effervescence cease: then strain and set the liquors aside, that crystals may form. These being removed, add to the liquor, if necessary, a little subcarbonate of soda, that the phosphoric acid may be accurately saturated; and dispose it, by evaporation again, to yield crystals, as long as these shall be produced. Finally, let the crystals be preserved in a well-closed vessel."

Dublin.

"Take of burnt bones, reduced to powder, *ten parts;* sulphuric acid of commerce, *seven parts.* Mix the powder with the sulphuric acid in an earthen vessel; add, gradually, seven parts of the water, and agitate the mixture. Digest for three days, adding from time to time more water, lest the materials should become dry, and continue the agitation; then pour over them five pints of boiling water, and strain through a linen rag, pouring on, at intervals, boiling water, until all the acid be washed out. Set the liquor apart that the impurities may subside, from which decant it, and evaporate it to one half; then add three pounds ten ounces of carbonate of soda (dissolved in eight parts of warm water); filter, and obtain crystals by repeated evaporation and cooling. If the salt be not perfectly pure, it may be purified by repeated solution and crystallization.

Syn. Phosphate de Soude (*F.*), Phosphosaures Natrum (*G.*), Fosfato di Soda (*I.*).

When bones are burnt to whiteness, the residue is chiefly phosphate of lime, 100 parts of which consist of 41 parts of acid, and 59 of base[1]; and with a small portion of carbonate

[1] Vauquelin.

of lime. The addition of sulphuric acid, as directed in the above formula, abstracts 0·40 parts of the lime, so as to form an insoluble sulphate of lime, and, involved in its mass, a soluble superphosphate of lime, for the separation of which, the digestion in vapour and the repeated effusions of boiling water are ordered. The soda of the carbonate of soda, which is added to the defecated and filtered solution, now unites with the superabundant phosphoric acid, by which means the lime is again left combined with as much of this acid only as renders it a neutral phosphate, which from its insolubility precipitates, and is easily separated from the phosphate of soda, which being soluble, remains dissolved in the water, and crystallizes on the subsequent evaporation of the filtered liquor.

There are some niceties in the manipulation of this process that require to be noticed. In the first place, if too much sulphuric acid be employed, sulphate of soda will be also produced; and as four parts only of sulphuric acid are required to decompose ten parts of phosphate of lime, both the above formulæ err in this particular; secondly, as the phosphate of soda does not crystallize well without an excess of base, a little more carbonate of soda must be added than is required simply to neutralize the excess of acid of the superphosphate; and, lastly, the evaporation must not be carried quite to the formation of a pellicle, as in this case the crystallization is indeterminate, and the whole often concretes into an irregular mass.[1]

Qualities. — This salt has a purely saline taste, resembling very much that of common salt. Its crystals are large, regular, transparent, oblique, rhombic prisms, having a specific gravity of 1·333, and efflorescing on exposure to the air. It is soluble in three parts of water at 60°, and in two parts of boiling water; and undergoes the watery fusion when heated. Its constituents, according to Thénard, are, in 100 parts, 19 of soda, 15 of phosphoric acid, and 66 of water; and, according to Berzelius, 20·33 of acid, 17·67 of base, and 62·80 of water. Mitscherlich makes them 1 eq. of acid = 55·4 + 1 of soda = 31·3 + 12 of water = 108. Chloride of barium, lime, and magnesia decompose this salt; and by the strong acids it is converted into biphosphate of soda.

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[1] A cheaper mode of preparing this salt has been given by M. Funcke, a German chymist. He adds to the matter of calcined bones, diffused in water, just enough dilute sulphuric acid to saturate the small portion of carbonate of lime it always contains. When the effervescence ceases, the whole is dissolved in nitric acid, and as much sulphate of soda added to the solution as of bone-ashes used. The whole is then distilled to recover the nitric acid; and the phosphate of soda is separated from the residue, which is a mixture of sulphate of lime and phosphate of soda, by solution and crystallization.

Medical properties and uses. — It is a mild cathartic, excellently adapted for children, and others who have a fastidious taste. It may be given dissolved in gruel, or broth, made without salt, by which its taste is very effectually covered. The dose is from ʒ vj. to ℥ ij. Although phosphate of soda was known before 1740, at which time it was described by Haupt, under the name of *sal mirabile perlatum*, yet it was not introduced into medical use as a purgative until about thirty years since, when it was recommended by Dr. George Pearson of London.

SODÆ CARBONAS, Lond. *Carbonate of Soda.*

"Take of impure carbonate of soda, *two pounds;* distilled water, *four pints.* Boil the impure carbonate of soda in the water for half an hour, and filter the solution whilst it is hot. Finally, set it apart that crystals may be formed."

SUBCARBONAS SODÆ. *Subcarbonate of Soda.*

"Take of impure carbonate of soda, *any quantity.* Bruise it, and then boil it in water until all the saline matter be dissolved. Filter the solution through paper, and evaporate it in an iron vessel, so that after refrigeration crystals may form."

SODÆ CARBONAS, Dub. *Carbonate of Soda.*

"Take of barilla, in powder, *one part;* water, *two parts.* Boil the barilla in the water, in a covered vessel, for two hours, occasionally stirring; filter the liquor; then bruise the barilla that remains with an equal quantity of water, and again boil it: this may be repeated a third time. The leys being filtered and mixed, evaporate them to dryness in a wide iron vessel, taking care that the saline mass, which will remain, be not again liquefied by too great a heat: stir it with an iron spatula till it become white; finally, dissolve it in boiling water, and after due evaporation, set it apart, that, as it cools, crystals may form. These will be purer if the barilla before each boiling be exposed for some time to the air. The crystallization should be effected when the air is at the freezing temperature, and in a liquor the specific gravity of which is, to that of water, as 1220 to 1000. If the salt be not very pure, repeat the solution and crystallization."

Syn. Natron Præparatum, P. L. 1787. Soucarbonate de Soude (*F.*), Sottocarbonato di Soda (*I.*).

Barilla, which was formerly used in the process of the London Pharmacopœia, and still is in that of Dublin, besides the carbonate of soda, contains sulphate of soda, and chloride of

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[1] *London Medical Review,* April, 1808, 139.

sodium, charcoal, lime, magnesia, argil, and silex, from which these processes are intended to separate it. The earths, being insoluble, are separated by the solution and filtration; while the foreign salts remain dissolved in the residuary liquor after the carbonate of soda has crystallized. In the present process of the London College, a purer carbonate is employed, which is manufactured on a great scale, by the decomposition of sulphate of soda and of chloride of sodium: it should supersede altogether the use of barilla.

Qualities.—Carbonate of soda has a mild alkalescent taste, and changes the vegetable blue and red colours to green. Its crystals are large transparent octahedrons with a rhombic base, truncated at the angles, which contain a large proportion of water: they effloresce when exposed to a dry air, and crumble down into a white, opaque powder. They undergo the watery fusion at 150° Fahr.; are soluble in two parts of water at 60°, and in considerably less than their weight of boiling water. Its constituents, according to the late analysis of D'Arcet[1], are, in 100 parts, 16·04 of acid, 20·85 of alkali, and 63·61 of water. Mr. Phillips makes them 15·3 of carbonic acid, 22·2 of soda, and 62·5 of water; or 1 eq. of acid$=$22·12$+$1 of soda$=$31·3$+$10 equivalents of water$=$90$=$143·42. By treating this salt in the method described under carbonate of potassa, any chlorides or sulphates it may contain are detected, while tartaric acid, added to its solution, discovers potassa, by forming a precipitate of the bitartrate. Carbonate of soda is incompatible with acids and acidulous salts, hydrochlorate of ammonia, and most metallic salts.

Medical properties and uses.—This salt is antacid and deobstruent. It is less acrid than the carbonate of potassa, and thence is in more general use in dyspepsia and acidities of the stomach, and in scrofulous affections. Its use has been of late strenuously recommended in hooping-cough, the protraction of which it is said to prevent. It is given, after the stomach and bowels have been duly evacuated, at first in combination with ipecacuanha and opium, and afterwards, when the violence of the cough has abated, with myrrh or cinchona.[2] The dose of this salt is from grs. x. to ʒss. given twice or thrice a day. M. Peschier has lately successfully

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[1] *Annales de Chimie*, xxi. 208.
[2] *Medico-Chirurgical Transactions*, vol. i.

employed it for the cure of bronchocele, and he considers it much more efficacious than iodine in this disease.[1] In bronchocele, Dr. Peschier gave it to the amount of 118 grains in a day, dissolved in water.

Officinal preparations.—*Sodæ Carbonas exsiccata*, L. D. *Sodæ Sesquicarbonas*, L. *Aqua Supercarbonatis Sodæ*, E. *Phosphas Sodæ*, E. D. *Sodæ Potassio-tartras*, L. E. D.

SODÆ CARBONAS EXSICCATA, Lond. *Dried Carbonate oj Soda.*

"Take of carbonate of soda, *a pound.* Expose the carbonate of soda to proper heat in a vessel, until it is dry, and afterwards to redness. Lastly, rub it into a powder."

SODÆ CARBONAS SICCATUM, Dub. *Dried Carbonate of Soda.*

"Liquefy the crystals of carbonate of soda in a silver crucible over the fire: then, in an augmented heat, stir the dissolved salt until, by the evaporation of the water, it become dry. Reduce it to a fine powder, and preserve it in stopped phials."

Syn. Soucarbonate de Soude sec (*F.*), Getrocknetes Kohlensaures Natrum (*G.*), Sotto-carbonato di Soda secco (*I.*), Unvollmaakte Koolenstoffzuure Soda (*Dutch*).

Owing to the great proportion of water of crystallization which the carbonate of soda contains, it readily undergoes the watery fusion, and is completely dried by continuing the heat; but its properties are not otherwise altered. The constituents of 100 parts, in this state, are 40·7 of acid, and 59·3 of soda[2], which nearly accords with the analysis of Dulong and Dalton; or 1 eq. of acid = 22·12 + 1 of soda = 31·3; making the equivalent = 53·42.

Medical properties and uses.—The chief advantage obtained from drying the carbonate of soda is the facility of exhibiting it in the form of pills; for when the crystallized salt is used for this purpose, the pill formed with it falls to pieces as soon as the salt effloresces. Dr. Beddoes[3] has extolled it, in this form, as a remedy in calculous affections; and it certainly affords relief from the painful symptoms attending calculus in the kidneys, and other urinary affections: but its effects are palliative only, and depend on its neutralizing the excess of acid in the stomach. The dose is from grs. x. to grs. xv., given three times a day. Beddoes directed it to be combined with soap and aromatics.

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[1] *Bib. Univer.* xxvii. 146. [2] *Nicholson's Journal*, 4t iii. 215.
[3] *Beddoes on the Nature and Cure of Calculus.*

SODÆ CARBONATIS AQUA, Dub. *Water of Carbonate of Soda.*

"Take of carbonate of soda, *any quantity;* dissolve it in distilled water, and let the sp. gr. of the solution be to distilled water as 1024 to 1000.

"A solution of this specific gravity is made by dissolving an ounce of carbonate of soda in one pound of distilled water."

The only object of this process is to obtain a solution of a determinate strength.

LIQUOR SODÆ EFFERVESCENS, Lond. *Effervescing Solution of Soda.*

"Take of sesquicarbonate of soda, *a drachm;* distilled water, *one pint.* Dissolve the sesquicarbonate of soda in the water; and pass into it, under pressure, more carbonic acid than is sufficient to saturate it. Preserve the solution in a well-stopped vessel."

AQUA SUPERCARBONATIS SODÆ, Edin. *Water of Supercarbonate of Soda.*

"Take of water, *ten pounds;* subcarbonate of soda, *two ounces;* dissolve, and subject the solution to a stream of carbonic acid gas procured from *three ounces* of carbonate of lime, and the same quantity of sulphuric acid, with three pounds of water, gradually and cautiously mixed together. It may be conveniently prepared in Nooth's apparatus; but if a large quantity of it be required, an apparatus capable of affording a greater pressure will be requisite. The fluid must be preserved in well-corked bottles."

AQUA CARBONATIS SODÆ ACIDULA, Dub. *Acidulous Solution of Carbonate of Soda.*

"Take of carbonate of soda any quantity. Dissolve it in water so that each pound *by measure* contain one drachm of soda: then in a proper apparatus pass through a stream of carbonic acid gas, extricated from white marble by means of muriatic acid diluted with six times its weight of water, until the carbonic acid is in excess in the fluid."

This preparation is manufactured on a great scale, of a much superior quality to any which the apothecary can prepare; and it is in very general use as a cooling beverage. Half a pint of it poured over two table-spoonfuls of lemon-juice, sweetened with a little sugar, forms an excellent and very agreeable effervescing draught; and the same quantity poured upon two ounces of boiling milk forms an excellent substitute for asses' milk.[1]

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[1] What are termed *sodaic powders* are attempted to be passed upon the public as capable of answering in every respect the purpose of *soda water;* but the salt

SODÆ SULPHAS, Lond. *Sulphate of Soda.*

"Take of the salt which remains after the distillation of hydrochloric acid, *two pounds;* boiling water, *two pints;* carbonate of soda, *a sufficient quantity.* Dissolve the salt in the water; then add gradually as much of the carbonate of soda as will saturate the acid. Boil the solution until a pellicle appear, and after having filtered it set it apart to crystallize. Pour the water from off the crystals, and dry them."

SULPHAS SODÆ, Edin. *Sulphate of Soda.*

"Dissolve in water the acidulous salt which remains after the distillation of muriatic acid, and having mixed it with carbonate of lime (*chalk*) in powder to remove the superfluous acid, set it apart until the impurities subside; then, having poured off the liquor, filter it through paper, and reduce it by evaporation, that crystals may be formed."

SODÆ SULPHAS, Dub. *Sulphate of Soda.*

"Dissolve the salt which remains after the distillation of muriatic acid in a sufficient quantity of boiling water. Evaporate the filtered solution to a proper point, and set it apart, that, as it slowly cools, crystals may form."

Syn. Natron Vitriolatum, P. L. 1787. Sulphate de Soude (*F.*), Krystalisirtes Natrum (*G.*), Solfato di Soda (*I.*).

From the low price of the salt manufactured on a great scale (see Part ii.), it is preferable to saturate the acidulous salt remaining after the preparation of the hydrochloric acid with chalk, and reject the sulphate of lime. The salt obtained by the Dublin process has a slight acidulous taste, and contains a quantity of sulphuric acid, but so loosely combined as scarcely to entitle it to be regarded as a supersalt; nor do its crystals differ in form from those produced by the other two formulæ.[1]

Qualities.—The taste of this salt is at first simply saline, but afterwards very disagreeably bitter. Its crystals are transparent, six-sided, irregular, channelled prisms, with dihedral summits; efflorescent, and rapidly falling to an opaque white powder, when exposed to the air. It is soluble in 2·86 parts of water at 60°, and 0·8 of boiling water; undergoes the watery fusion when heated[2], and in a strong heat is partially

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formed by the solution of these powders is a tartrate of soda, and not a bicarbonate. The powders are packed in two distinct papers, the one blue and the other white; the blue containing ʒ ss. of carbonate of soda, the white gr. xxv. of tartaric acid.

[1] The crystals of the bisulphate formed by dissolving the sulphate in sulphuric acid, and crystallizing, are rhomboidal. The artificial salts, sold under the name of *Cheltenham salts,* owe their activity to this salt. For an account of them, see Dr. Paris's *Pharmacologia;* art. *Sulphas sodæ.*

[2] Mr. Faraday found that, when it is heated in a flask, one part dissolves in the water of crystallization, while the other is thrown down in an anhydrous

decomposed. According to Berzelius, 100 parts contain 24·64 of acid, 19·36 of alkali, and 56 of water; and in the dried state, according to Bulcholz, 54 acid, and 46 of alkali[1]: but according to Mr. Phillips, 55·55 of acid, and 44·45 of soda in the anhydrous state[2]: or in its crystalline state, its constituents are, of soda 1 eq. $=31·3+1$ of acid $=40·1+10$ of water $=90$; making the equivalent 161·4.

Medical properties and uses. — Sulphate of soda is a very common and useful purgative; but from its nauseous taste it is not very generally prescribed by the physician, although this may be readily disguised by a small quantity of lemon-juice, or of cream of tartar, added to the solution. It is incompatible in prescriptions with carbonate of potassa, chloride of calcium, nitrate of silver, and acetate of lead. The dose is from ℥ss. to ℥ij., but, in the effloresced state, half of these quantities is sufficient.

SODÆ POTASSIO-TARTRAS, Lond. *Potassio-tartrate of Soda.*

"Take of carbonate of soda, *twelve ounces;* bitartrate of potassa in powder, *sixteen ounces;* boiling water, *four pints.* Dissolve the carbonate of soda in the boiling water, and add gradually the bitartrate of potassa. Filter the solution; then apply a gentle heat until a pellicle floats, and set it aside to crystallize. Pour off the water from the crystals, and dry them. Evaporate the liquor again, that it may yield crystals."

TARTRAS SODÆ ET POTASSÆ, Edin. *Tartrate of Soda and Potassa.*

"Take of subcarbonate of soda, *one part;* supertartrate of potassa, *three parts,* or *a sufficient quantity;* boiling water, *fifteen parts.* To the subcarbonate, dissolved in the water, gradually add the supertartrate rubbed to a fine powder, as long as effervescence is excited, which generally ceases before the whole of the three parts of the supertartrate are added: when the fluid is cold, filter it through paper, and after a proper degree of evaporation, set it aside that crystals may form."

SODÆ ET POTASSÆ TARTRAS, Dub. *Tartrate of Soda and Potassa.*

"Take of carbonate of soda, *five parts;* bitartrate of potassa, rubbed to a fine powder, *seven parts;* boiling water, *fifty parts.* Dissolve the carbonate of soda in the water, and gradually add the bitartrate of potassa; filter the solution through

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state; and that at 180° $\frac{8}{9}$ of the salt take all the water, whilst $\frac{1}{9}$ separate in the dry state. *Journ. of Science,* vol. xix. p. 153.

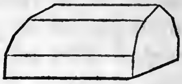
[1] *Nicholson's Journal,* 4to. iii. 215. [2] *Trans. of Pharm.* 1837.

paper; evaporate, and set it aside, that, as it slowly cools, crystals may form."

Syn. Tartrate de Soude et de Potasse (*F.*), Natrum-weinstein (*G.*), Tartrato di Potassa e di Soda (*I.*).

In these processes the superabundant acid of the bitartrate is saturated by the soda of the carbonate, the carbonic acid of which is dissipated in the gaseous form; and a triple salt is obtained by the evaporation, instead of two distinct salts being formed from the different alkaline bases.

Qualities. — This salt has a bitter, saline taste. Its crystals are large, regular, transparent, hard, rhomboidal prisms, but often in halves, as in the figure. They are slightly efflorescent, and soluble in five parts of water at 60°: are decomposed by the strong acids, chloride of barium, lime, and by a red heat. The constituents of 100 parts of this salt, according to Schulze, are, 41·3 of tartaric acid, 14·3 of potassa, 13·3 of soda, and 31·1 of water[1]: according to Vauquelin, they are, tartrate of potassa, 54 parts; tartrate of soda, 46 parts: and according to Mr. Phillips (*Translation of the Pharmacopœia*), 40 parts of tartrate of potassa, 34·5 of tartrate of soda, and 25·5 of water, in 100 parts. In equivalents the crystals contain 1 eq. of tartrate of potassa = 113·63 + 1 of tartrate of soda = 97·8 + 8 of water = 72; making the equivalent 283·43. It is incompatible with acids and acidulous salts, acetate and diacetate of lead, and chloride of calcium.



Medical properties and uses. — Tartrate of potassa and soda, or potassio-tartrate of soda, is a cooling and not very unpalatable cathartic. It was introduced into practice by M. Seignette[2], an apothecary of Rochelle, and the preparation kept a secret until it was discovered and published by Boulduc and Geoffrey, in 1731. It operates moderately, and without exciting much irritation; hence it is well suited to nephritic and puerperal cases. The dose is from ʒij. to ℥j. dissolved in any convenient vehicle.

LIQUOR SODÆ CHLORINATÆ, Lond. *Solution of Chlorinated Soda.*

"Take of carbonate of soda, *a pound;* distilled water, *forty-eight fluid ounces;* chloride of sodium, *four ounces;* binoxide of manganese, *three ounces;* sulphuric acid, *four ounces.* Dissolve the carbonate of soda in two pints of the water, then put the chloride of sodium and the binoxide of manganese, rubbed into powder, into a retort; and add to

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[1] *Gehlen, Journ.* iv. 210. *Thomson's Chymistry,* 4th edit. iii. 96.
[2] Hence its appellations of *Sal de Seignette, Sal Ruppellensis.*

them the sulphuric acid mixed with three fluid ounces of water and cooled. Heat the mixture, and transmit the chlorine thus evolved, first through five ounces of water, and then the above prescribed solution of the carbonate of soda."

In this process the chlorine is extricated by the oxygen furnished from the binoxide of manganese combining with the sodium to form soda, which unites with the sulphuric acid, and constitutes a sulphate, the chlorine escaping in the form of gas. The object of passing the liberated chlorine through water, before it enters the alkaline solution, is to free it from any hydrochloric acid which may be formed by a partial decomposition of the water of the mixed materials. The mixture formed with the alkaline solution and the chlorine closely resembles that which is known as *Labarraque's disinfecting soda liquid;* and is supposed to be a solution of the carbonate of soda, merely holding chlorine in such a manner that it admits of being crystallized with the carbonate.

Qualities.—The solution, whether recent, or of the crystals redissolved, is of a pale yellow colour, with a sharp, brackish, acerb taste. It first browns and then bleaches turmeric paper: the browning depends on the carbonate of soda; the bleaching on the chlorine. It slowly evolves the chlorine when it is exposed to the air, and crystals of carbonate of soda form as the fluid evaporates.

Medical properties and uses.—This solution is astringent, and, if any thing can strictly be so termed, antiseptic. I have administered it, largely diluted, in typhus and other low fevers, to counteract the sedative influence of the sulphureted hydrogen which accumulates in the intestines, in these fevers. I have found it, also, most valuable as an injection into the nostrils, for correcting the acrid, offensive discharge which takes place from the nostrils in malignant scarlatina. Its chief use, however, is as a disinfecting agent. No satisfactory theory of its action has been advanced; but I am disposed to think that the benefit arises from the decomposition of the pernicious effluvia, which seems to consist of sulphureted hydrogen, holding in solution an ammoniacal oil. Now, when chlorine comes in contact with sulphureted hydrogen, the hydrogen combines with the chlorine and forms hydrochloric acid, whilst the sulphur is precipitated, and along with it the ammoniacal oil.

ANIMALIA.

PREPARATIONS FROM ANIMALS.

The substances of this division are few in number, and are not remedies of much efficacy.

ADEPS SUILLUS PRÆPARATUS, Dub. *Prepared Hog's Lard.*

" Let fresh lard, cut into small pieces, be melted by a moderate heat, and strained by pressing it through a linen cloth.

" Lard, which is prepared by the dealers, and is preserved with salt, is to be melted with twice its weight of boiling water, and the mixture well stirred; it is then to be allowed to cool, when the lard may be separated.

ADEPS OVILLUS PRÆPARATUS, Dub. *Prepared Suet.*

" To be prepared in the same manner as lard."

The properties of lard and suet have been already detailed. (Part ii.) The above processes are intended to purify them; but, in order to obtain them very pure, it is necessary that they be washed in water until the water come off colourless, before they be melted. Any water that may remain attached to the fat is evaporated during the melting; and that it is all evaporated is known by throwing a little of the melted fat into the fire, when it will crackle if any water be present. The heat must not be raised above 97°, the melting point of fat; as otherwise the fat is decomposed, rendered acrid, and assumes a yellow colour. This purification is seldom attempted by the apothecary, as both kinds of fat can be procured very well purified from the dealers. To keep lard clean, and preserve it from the action of the air, it is generally run into bladders while in the liquid state.

CARBO ANIMALIS PURIFICATUS, Lond. *Purified Animal Charcoal.*

" Take of animal charcoal, *a pound;* hydrochloric acid, water, of each, *twelve fluid ounces.* Mix the acid with the water, and pour the mixture, by a little at a time, over the animal charcoal; then digest with a gentle heat for two days, frequently stirring. Set aside, and decant the supernatant fluid; then wash the charcoal with water frequently renewed, until all acidity be removed: finally dry it."

The *ivory black* of the shops is animal charcoal mixed with the earthy matter of bone, namely, phosphate and carbonate of lime, which are taken up by the hydrochloric acid, and the charcoal left unacted upon. The subsequent washings are requisite to free it from the acid.

Pure animal charcoal, when digested with coloured vegetable infusions or solutions, deprives them of much if not the

the whole of their colouring matter: it thus becomes a valuable agent in many pharmaceutical processes.

CORNU USTUM[1], Lond. *Burnt Hartshorn.*

"Burn pieces of hartshorn in an open fire until they become thoroughly white; then powder them, and prepare them in the manner directed for the preparation of chalk."

From the Latin title given to this preparation, one might be led to suppose that any kind of horn would serve as a substitute for hartshorn, which is intended to be designated: but the properties of the horns of the deer are more similar to those of bone than those of other animals; the proportion of cartilage, however, is greater in the hartshorn than in bone.

In performing this operation the fire must not be too violent, as the horn is apt to suffer a species of vitrification on its surface, when exposed to a very strong heat, which prevents the internal parts from being completely burnt. The residue of 100 parts of hartshorn consists, after the burning, of 57·5 of phosphate of lime, 1 of carbonate of lime, and a minute portion of phosphate of magnesia.

Medical properties and uses. — Phosphate of lime is perfectly inert when taken into the stomach; and the analysis of burnt hartshorn has clearly proved, that the former idea of its antacid properties was erroneous. Experience has not yet confirmed the utility of burnt hartshorn for any purpose as a remedy.

Officinal preparation.—*Pulvis Antimonii Compositus*, L.

TESTÆ PREPARATÆ, Lond. *Prepared Shells.*

"Wash the shells with boiling water, having previously freed them from extraneous matters; then prepare them in the manner directed for the preparation of chalk."

AQUÆ DISTILLATÆ.

DISTILLED WATERS.

The volatile oil, on the presence of which the odour and the taste of plants in a considerable degree depend, is elevated during distillation with water; and a portion of it being retained in solution, the water thus acquires the odour and taste of the vegetable with which it is distilled. The qualities, however, thus acquired by water, are scarcely, in any case, sufficient to give it much power as a remedy; thence the

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[1] Cornu cervi ustum, P. L. 1787.

distilled waters are generally employed merely as elegant vehicles for the exhibition of more active substances.

Waters distilled from aromatic plants are more grateful when the plant is used in the dried state; but when delicate odorous flowers or herbs are employed, and the water acquires little more than odour by the distillation, the vegetable should always, if possible, be used in the recent state. Much care is required, in conducting the process, to prevent any of the vegetable matter from being scorched, and to stop the distillation before the water is tainted by empyreuma. Notwithstanding, however, every attention which can be given, distilled waters, when newly prepared, have a very disagreeable empyreumatic odour, to dissipate which the vessels holding the waters must be left open to the air as long as any of the unpleasant odour remains; but afterwards it is essential for the preservation of the waters that they be preserved in closely-corked vessels.

When long kept, many of the distilled waters undergo a species of decomposition: they become slightly sour, and a ropy viscid matter forms in them, owing to the essential oil which they contain undergoing decomposition. The addition of the spirit is intended to prevent this change from taking place, but it is not adequate to the effect intended; and a much preferable mode is to redistil the waters, after which they will keep good for several years.

Several of these waters are prepared on a great scale, of a superior quality, and cheaper than any the apothecary can prepare.

AQUA DISTILLATA, Lond. *Distilled Water.*

"Take of water, *ten gallons.* First distil two pints, which are to be rejected, and then distil eight gallons. Preserve the distilled water in a glass bottle."

Edinburgh.

"Let water be distilled in clean vessels, until two thirds of the quantity employed have distilled over."

Dublin.

"Take of spring water, *twenty pounds.* Put them into a glass retort, and having rejected the first pound which comes over, let one gallon be distilled over with a gentle heat."

Syn. Eau distillée (*F.*), Einfaches distillirtes wasser (*G.*,) Gemeenes Destillert Water (*Dutch*), Watten (*Swed.*), Acqua Distillata (*I.*), Agua Distillada (*S.*).

Water is almost universally diffused over the surface of the earth, but it is not found perfectly pure in any place, which is owing to its great solvent powers enabling it to take up a portion of many substances with which it must come into contact, in its natural state. These impregnations, however, in spring and in river water, are not sufficient to give it any very sensible taste, or to render it unfit for the ordinary purposes of life; but for many pharmaceutical purposes it is necessary that the water be absolutely free from every foreign ingredient. *Rain* and *river water* are the purest kind of natural water, but they nevertheless contain a portion of carbonic acid gas, and minute quantities of carbonate of lime and of chloride of calcium: in spring water, besides these ingredients, is found a small portion of chloride of sodium; *well water*, which is spring water obtained from a greater depth, holds in solution a much larger portion of carbonic acid, and several earthy salts, the principal of which are sulphate and carbonate of lime. By distillation, water is freed from these ingredients, and rendered nearly pure; but it is tasteless and vapid, owing to the absence of the air which it contains in its natural state. The process should be conducted slowly, with a moderate degree of heat, and not continued longer than the time specified in the formulæ, otherwise a minute portion of the saline matter contained in the natural water passes over in the distillation.

Although the necessity of distilled water for many pharmaceutical operations is very obvious, yet, as it is not always easy for the apothecary to prepare distilled water, *rain water*, filtered through alternate strata of well-washed sand or powdered flints, and charcoal, will answer every purpose for which distilled water is required. Soft water is a more powerful menstruum of vegetable matter than hard water; and resinous substances cannot easily be mixed with water containing calcareous matter, even when mucilage is used, whereas they readily mix with very soft or distilled water. Perhaps it should be a rule to use filtered rain water only in all pharmaceutical operations. In extemporaneous prescriptions distilled water is often ordered when there is no necessity for its use, and often neglected to be ordered when it is absolutely necessary. It may, therefore, be useful to know that it is necessary in formulæ containing any of the following substances:—*Acidum Sulphuricum, Acidum Citricum, Acidum Hydrocyanicum, Antimonii Potassio-Tartras, Argenti Nitras, Cuprum Ammonio-Sulphas, Ferri Sulphas, Ferri Potassio-Tartras, Ferri Iodidum, Hydrargyri Bichloridum, Liquor Ammoniæ, Liquor Plumbi Acetas et Diacetas, Liquor Potassæ, Solutio Chloridi Barii, Vinum Ferri, Zinci Sulphas.*

AQUA ANETHI, Lond. *Dill Water.*

Syn. Eau d'Aneth puant (*F.*), Acqua di Aneto Puzzolente (*I.*).

"Take of dill seeds, bruised, *a pound and a half;* proof spirit, *seven ounces;* water, *two gallons.* Distil one gallon."

This water has an unpleasant odour and little pungency. It is used principally as a carminative for infants; and is a good vehicle for giving magnesia and rhubarb to these tender patients.

AQUA CARUI, Lond. Dub. *Carraway Water.*

Syn. Eau de Carvi (*F.*), Feldkumel wasser (*G.*), Acqua di Carvi (*I.*).

It is prepared in the same manner as dill water.

Carraway water possesses a considerable aromatic flavour and pungency, and may be used for the same purposes as dill water.

AQUA FLORUM AURANTII, Lond. *Orange-flower Water.*

"Take of orange flowers, *ten pounds;* proof spirit, *seven fluid ounces;* water,*two gallons.* Let a gallon distil.

An agreeable vehicle for medicinal agents.

AQUA CITRI AURANTII, Edin. *Water of Orange-peel.*

Syn. Eau d'Orange (*F.*), Pomeranzen wasser (*G.*), Acqua de Arancio (*I.*).

"Take of fresh orange-peel, *two pounds.* Add so much water, that when ten pounds have been drawn off by distillation, there shall remain a quantity sufficient to prevent empyreuma. After due maceration distil ten pounds, to which add five ounces of diluted alcohol."

The water has the flavour only of the orange-peel.

AQUA CITRI MEDICÆ, Edin. *Water of Lemon-peel.*

Syn. Eau de Citronier (*F.*), Citronen wasser (*G.*), Acqua di Limone (*I.*).

This is prepared in the same manner as the former; ten pounds of water being distilled from two pounds of fresh lemon-peel. It has the flavour of the peel, but is seldom used.

AQUA CINNAMOMI, Lond. Dub. AQUA LAURI CINNAMOMI, Edin. *Cinnamon Water.*

Syn. Eau de Cannelle (*F.*), Zimmt wasser (*G.*), Acqua di Cinamomo (*I.*).

"Take of cinnamon, bruised, *a pound and a half;* or oil of cinnamon, *two drachms;* proof spirit, *seven fluid ounces;* water *two gallons.* Distil a gallon."

This water is milky, and has the agreeable flavour and pungency of the cinnamon, without its astringency; but the oil being ponderous is apt to separate, leaving the water clear and nearly insipid. It is a gentle stimulant, but is chiefly used to cover the nauseous taste of other medicines.

Officinal preparations. — *Mistura Guaiaci,* L. *Mistura Spiritus Vini Gallicei,* L.

AQUA LAURI CASSIÆ, Edin. *Water of Cassia Bark.*

Syn. Eau de Casse (*F.*), Acqua di Cannella (*I.*).

This is prepared from one pound of bruised cassia bark;

it is often substituted for cinnamon water, being less expensive; but it is also less agreeable.

AQUA FŒNICULI, Lond. Dub. *Fennel Water.*

Syn. Eau de Fenouil (*F.*), Fenchel wasser (*G.*), Acqua di Finnocchio (*I.*).

It is prepared in the same manner as dill water.

It is rarely if ever employed.

AQUA LAURO-CERASI, Dub. *Laurel Water.*

"Take of the fresh leaves of the Prunus *Lauro-cerasus*, *one pound;* water, *three pints.* Distil one pint, and add one ounce of rectified spirit, and of compound spirit of lavender."

This is a weak solution of hydrocyanic acid in water. It ought to be used with caution.

AQUA MENTHÆ PIPERITÆ, Lond. Edin. AQUÆ MENTHÆ PIPERITIS, Dub. *Peppermint Water.*

Syn. Eau de Menthe poivrée (*F.*), Pfeffermünz wasser (*G.*), Acqua di Menta piperitide (*I.*).

"Take of peppermint, dried, *two pounds* (*three pounds*, Edin.); or oil of peppermint, *two drachms;* proof spirit, *seven fluid ounces.* Distil a gallon."

Peppermint water has the flavour and taste of the plant in a considerable degree. It is sometimes used alone as a carminative, but more generally for the purpose of covering the taste of other medicines.

AQUA MENTHÆ VIRIDIS, Lond. AQUA MENTHÆ SATIVÆ, Dub. *Spearmint Water.*

It is prepared in the same manner as above.

AQUA PIMENTÆ, Lond. AQUA MYRTI PIMENTÆ, Edin. AQUA PIMENTÆ, Dub. *Pimenta Water.*

Syn. Eau de Poivre de Jamaique (*F.*), Nelherpfeffer wasser (*G.*), Acqua di Pimenti (*I.*).

"Take of pimento berries, bruised, *a pound;* or oil of pimenta, *two drachms;* proof spirit, *seven fluid ounces;* water, *two gallons.* Distil a gallon."

This water has the odour and aromatic quality of the Jamaica pepper, but is not very agreeable to the taste. It is used as a carminative in dyspepsia.

AQUA PULEGII, Lond. Dub. AQUA MENTHÆ PULEGII, Edin. *Pennyroyal Water.*

Syn. Eau de Menthe peuliot (*F.*), Poley wasser (*G.*), Acqua di Puleggio (*I.*).

It is prepared in the same manner as the other mint waters.

Pennyroyal water has the flavour and taste of the green herb. It is used for the same purposes as peppermint water.

AQUA ROSÆ, Lond. AQUA ROSÆ CENTIFOLIÆ, Edin. *Rose Water.*

Syn. Eau des Roses (*F.*), Rosin wasser (*G.*), Acqua di Rose (*I.*), Agua rosada (*S.*).

"Take of damask roses, *ten pounds;* proof spirit, *seven fluid ounces;* water, *two gallons.* Distil a gallon."

AQUA ROSÆ, Dub. *Rose Water.*

"Take of the fresh petals of the damask rose, freed from their claws, *eight pounds;* water, *a sufficient quantity to prevent empyreuma.* Distil a gallon."

This water has the agreeable odour of the rose in great perfection when properly prepared; which, however, is seldom the case, except when it is made on a large scale. It is very apt to spoil, unless it be rectified by a second distillation: but spirit of wine ought not to be added to rose water.

As rose water is perfectly free from any acrimony, and, except in point of odour, does not differ from simple distilled water, it is very generally employed in collyria, with acetate and diacetate of lead, and acetate and sulphate of zinc.[1]

AQUA SAMBUCI, Lond. *Elder Water.*

"Take of elder flowers, *ten pounds;* or oil of elder[2], *two drachms;* proof spirit, *seven fluid ounces;* water, *two gallons.* Let a gallon distil."

CATAPLASMATA.

CATAPLASMS.

CATAPLASMS are in general extemporaneous preparations; but the following formulæ were introduced into the Pharcopœias, to fix the proportions of the ingredients.

CATAPLASMA ALUMINIS, Dub. *Alum Cataplasm.*

"Take the white of two eggs; alum, *one drachm.* Agitate them together until a coagulum is formed."

The best method of forming this coagulum is to put a lump of alum into the albumen, and beat the whole with a spatula until the coagulum forms, which must then be separated from the alum.

This is an excellent application in ecchymosis of the eye, and in ichorous ophthalmia: it should be applied between folds of muslin. It is the solution of the alum held in the coagulum, as in a sponge, which is the active part of the preparation.

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[1] Rose water was first made in Persia; and the Persian rose water was long the most celebrated for its excellence.

[2] I have never seen any oil of elder.

CATAPLASMA CARBONIS LIGNI, Dub. *Cataplasm of Charcoal.*

"Take of charcoal, which has been recently made red hot, and extinguish by pouring dry sand over it, and triturated into a very fine powder, *a sufficient quantity*, and add it to the simple cataplasm made warm."

Recently prepared charcoal has the property of destroying fœtid odours, but it loses much of this if it be allowed to cool in the open air. After it is cold it should be cleansed from the sand, powdered, and immediately stirred into the poultice, which should be made thinner than nsual. Such a poultice has been found highly beneficial in fœtid and gangrenous sores. It should be renewed several times in twenty-four hours.

CATAPLASMA CONII, Lond. Dub. *Cataplasm of Hemlock.*

"Take of dried hemlock, *two ounces;* water, *a pint.* Mix, and add as much linseed bruised as is required to make it of a proper consistence."

An useful application for allaying pain in irritable, strumous, and cancerous sores.

CATAPLASMA DAUCI, Dub. *Cataplasm of Carrot.*

"Take of the root of cultivated carrot, *any quantity.* Boil the root in water, until it be soft enough to make a poultice."

This is an excellent emollient poultice, and is much used in cases of malignant and offensive sores.

CATAPLASMA FERMENTI, Lond. *Yest Cataplasm.*

"Take of flour, *a pound;* yest of beer, *half a pint.* Mix, and expose the mixture to a gentle heat, until it begin to rise."

CATAPLASMA FERMENTI CEREVISIÆ, Dub. *Yest Cataplasm.*

"Take of yest of beer, *half a pound;* wheat flour, *a pound.* Mix, and aid the swelling of the mixture by a gentle heat."

The rising is produced by the extrication of carbonic acid gas, on which the efficacy of the cataplasm depends; and which is evolved by the heat applied to the mixture exciting the fermentative process. In this state it is applied to painful gangrenous, or foul ulcers; and soon corrects the fœtor of the discharge, while at the same time it hastens the sloughing of the sores.

CATAPLASMA LINI. *Cataplasm of Linseed.*

"Take of boiling water, *a pint;* bruised linseed, *as much as may be sufficient* to make it of a proper consistence. Mix.

CATAPLASMA SIMPLEX, Dub. *Simple Cataplasm.*

"Take of the powder for a cataplasm, *any quantity;* boiling water enough to make a warm poultice, the surface of which should be covered with olive oil."

An excellent emollient poultice, which should be frequently renewed.

CATAPLASMA SINAPIS, Lond. Dub. *Cataplasm of Mustard.*

"Take of mustard seed, linseed, of each in powder, *half a pound;* hot vinegar, *a sufficient quantity.* Mix them to the thickness of a cataplasm."

This cataplasm is a powerful local stimulant and rubefacient. It should be spread on cloths to the thickness of about half an inch, and applied to the soles of the feet in the low stage of typhus fever, particularly when stupor or delirium is present; and in apoplexy, coma, and other cases in which there is a great determination to the head: in deep-seated inflammatory pains. Its rubefacient effects are very quickly produced, and often so powerfully as to raise a blister on the part; but it should be taken off before this is produced.

CERATA.

CERATES.

THESE are unctuous compositions, possessing a certain degree of firmness, intermediate between that of plasters and that of ointments. Their consistence depends on the wax they contain; and from it they derive their generic appellation. The most important circumstance to be attended to in their preparation is the freshness of the fat and the oils employed: and their preservation in this state.

CERATUM, Lond. *Cerate.*

"Take of olive oil, *four fluid ounces;* yellow wax, *four ounces.* Add the oil to the melted wax, and strain."

Syn. Cérat simple (*F.*), Cerotto semplice (*I.*).

This is an useful simple emollient dressing to excoriations and sores.

CERATUM CALAMINÆ, Lond. *Calamine Cerate.*

"Take of prepared calamine, wax, of each *half a pound;* olive oil, *sixteen fluid ounces.* Mix the oil with the melted wax; then remove them from the fire, and as soon as they begin to thicken, add the calamine, stirring constantly until the cerate be cold."

CERATUM CARBONATIS ZINCI IMPURI, Edin. *Cerate of impure Carbonate of Zinc.*

"Take of simple cerate, *five parts;* prepared impure carbonate of zinc, *one part.* Mix."

UNGUENTUM CALAMINARE, Dub. *Calamine Ointment.*

"Take of ointment of yellow wax, *five pounds;* prepared calamine, *a pound.* Make them into an ointment."

These preparations are very useful dressing to excoriations and ulcers; and as they are in some degree desiccative, they are also applied to burns after the inflammation is abated; and to the eyelids in ophthalmia tarsi. They have been long known in practice under the name of *Turner's Cerate.*

CERATUM CETACEI, Lond. *Spermaceti Cerate.*

"Take of spermaceti, *two ounces;* white wax, *eight ounces;* olive oil, *a pint.* Add the oil to the spermaceti and the wax melted together; and stir them until they be cold,"

CERATUM SIMPLEX, Edin. *Simple Cerate.*

"Take of olive oil, *six parts;* white wax, *three parts;* spermaceti, *one part.* Melt the wax and spermaceti in the oil, with a gentle heat; then keep constantly stirring, until the mixture stiffen in cooling."

Syn. Cérat de blanc de baleine (*F.*), Cerotto di Spermaceti (*I.*).

These are soft cooling dressings.

Officinal preparations. — *Ceratum Cantharidis,* L. *Ceratum Carbonatis Zinci impuri,* E.

CERATUM CANTHARIDIS, Lond. *Cerate of Blistering Flies.*

"Take of cantharides reduced to a very fine powder, *an ounce;* spermaceti cerate, *six ounces.* Add the cantharides to the cerate softened by heat, and mix them together."

Syn. Cérat de Cantharides (*F.*), Cerotto di Cantarille (*I.*).

This cerate is intended to promote a purulent discharge from a blistering surface, without occasioning irritation. In some habits, however, it causes strangury, great pain of the part, swelling of the lymphatics, and so much general irritation as to produce œdematose swellings and erysipelas of the neighbouring parts.[1]

It is preferable to spread cerates or ointments, intended to keep open issues, on lint; and the dressings should in all cases be renewed once in twenty-four hours.

CERATUM HYDRARGYRI COMPOSITUM, Lond. *Compound Cerate of mercury.*

"Take of the stronger ointment of mercury, soap cerate, each *four ounces:* camphor *an ounce.* Rub them together until they are incorporated.

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[1] In one case, which came under my observation, a blister on the scalp was dressed for four days with this cerate. On the fourth day the head swelled to an alarming size; and an œdematose erysipelas covered the scalp and face, and shut up the eyes; accompanied with a great degree of fever. On removing the acrid dressings, and employing emollient fomentations, with dressings of cetaceous ointment, these alarming symptoms soon subsided.

This cerate is well adapted to excite action in indolent tumours.

CERATUM PLUMBI ACETATIS, Lond. *Cerate of Acetate of Lead.*

"Take of acetate of lead in powder, *two drachms;* wax, *two ounces;* olive oil, *eight fluid ounces.* Melt the wax in seven fluid ounces of the oil; then add, gradually, the acetate of lead, separately rubbed down with the remaining oil, and stir with a spatula, until they be thoroughly incorporated."

This is an excellent cooling cerate for burns, excoriations, and other inflamed sores.

CERATUM PLUMBI COMPOSITUM, Lond. *Compound Cerate of Lead.*[1]

"Take of solution of diacetate of lead, *three fluid ounces;* wax, *four ounces;* olive oil, *half a pint;* camphor, *half a drachm.* Melt the wax and mix it with eight fluid ounces of the oil; then remove them from the fire, and as soon as they begin to thicken, add gradually the solution of diacetate of lead, and stir assiduously with a spatula till they be cold. Finally, mix with these the camphor dissolved in the remainder of the oil."

This composition is similar to what was recommended by Goulard, as a mode of applying lead in the form of ointment, and long known under the name of *Goulard's Cerate.* It is applicable to the same cases as the former cerate.

CERATUM RESINÆ, Lond. *Resin Cerate.*

"Take of resin, wax, each *a pound;* oil of olive, *sixteen fluid ounces.* Melt the resin and the wax together by a slow fire, then add the oil, and strain the cerate while it is hot through a linen cloth."

UNGUENTUM RESINOSUM, Edin. *Resinous Ointment.*

"Take of hog's lard, *eight parts;* resin, *five parts;* yellow wax, *two parts.* Melt the whole with a gentle heat, and stir the mixture until it stiffen in cooling."

UNGUENTUM RESINÆ ALBÆ, Dub. *Ointment of White Resin.*

"Take of yellow wax, *a pound;* white resin, *two pounds;* prepared hog's lard, *four pounds.* Make them into an ointment, which is to be strained, while it is hot, through a sieve."

Syn. Cérat Résineux (*F.*), Harzzerat (*G.*), Cerotto Resinoso (*I.*).

These ointments are stimulant, digestive, and cleansing; and therefore form an excellent dressing for foul and indolent ulcers.

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[1] This name is improper. It ought to have been *ceratum plumbi diacetatis comp.;* the virtue of the composition depending on the diacetate of lead, not on lead.

Officinal preparation. — *Linimentum Terebinthinæ*, L.

CERATUM SABINÆ, Lond. *Cerate of Savine.*

"Take of savine, bruised *a pound;* wax, *half a pound;* lard, *two pounds.* Melt the lard and the wax together, and boil the savine leaves in the mixture; then strain through a linen cloth."

UNGUENTUM SABINÆ, Dub. *Savine Ointment.*

"Take fresh leaves of savine, freed from the stalks and bruised, *half a pound;* prepared hog's lard, *two pounds;* yellow wax, *half a pound.* Boil the leaves with the lard until they become crisp; then strain with expression; lastly, add the wax, and melt them together."

The preparation of this ointment is exceedingly difficult, as the acrid principle of the savine, on which its efficacy depends, is much injured by long boiling, or by too high a temperature. It would be better to express the acrid juice from the fresh leaves, and mix it with the ointment when it begins to thicken by cooling. The ointment, when good, has a beautiful deep green colour, and the odour of the fresh-bruised herb. It should be kept in closely covered pots, as it soon loses its virtue by exposure to the air.

Savine ointment, which was first described by Mr. Crowther[1], is well calculated for keeping up a purulent discharge from a blistered surface; which it does as effectually, and with much less irritation, than the ointment of cantharides. A white coat is apt to form on the discharging surface, and must be removed occasionally, so as to allow the cerate to be applied to the sore.

CERATUM SAPONIS, Lond. *Cerate of Soap.*

"Take of soap, *ten ounces;* wax, *twelve ounces and a half;* oxide of lead, powdered, *fifteen ounces;* olive oil, *a pint;* vinegar, *a gallon.* Boil the vinegar with the oxide of lead over a slow fire, stirring diligently until they incorporate; then add the soap and boil again in a similar manner, until the moisture be entirely evaporated; lastly, mix the wax, previously melted with the oil."

The efficacy of this cerate evidently depends on the acetate of lead which is formed in the first stage of the process, the soap answering scarcely any other purpose than to give consistence and adhesiveness. It is occasionally used as a cooling dressing.

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[1] *Observations on White Swelling.*

CONFECTIONES.

CONFECTIONS.

UNDER this title the London College comprehends the *Conserves* and *Electuaries* of the Edinburgh and Dublin Pharmacopœias. There is, however, a distinction between the confections or conserves and electuaries, which prevents them in strict propriety from being classed together; and this we shall point out, although at the same time we adhere to the title of the London College.

CONFECTIONS or CONSERVES consist of fresh vegetable matters, beat into an uniform mass with refined sugar. They are designed to preserve, as nearly as possible, unaltered, the virtues or properties of recent vegetables, and to prevent the decomposition to which they would otherwise be liable; and although several delicate flowers and fruits and juicy plants can be well preserved by this means, yet this form of preparation is not adapted for all plants; and in many cases, the active ingredients are injured by the fruits being kept in this state. As remedies, confections possess little activity; and are chiefly useful as vehicles for the administration of more active substances. They should be kept in closely covered jars, in order to preserve their proper degree of moisture.

ELECTUARIES[1] are mixtures of vegetables and light earthy powders, combined by means of honey or of syrup so as to form masses of a moderate consistence. All substances of this description may therefore be made into electuaries; but, as the intention of this form of preparation is to render remedies as palatable as possible, those matters only can be employed to form electuaries, the taste of which is not too ungrateful to be covered by syrup or honey. They are more active remedies than conserves; but still the more powerful vegetable substances cannot well be exhibited in this form, on account of their taste; and the metallic salts are too ponderous to remain suspended in either syrup or honey. In making electuaries, the degree of consistence must always be regulated by the nature of the substances which enter into them.

"In conserves," as Dr. Murray justly remarks, "the addition of the saccharine matter is in much larger proportion, and is designed to preserve the vegetable matter; in electuaries the syrup is designed merely to communicate the required form."

"If confections have become hard from long keeping, they are to be moistened with water, so as to restore their proper consistence."

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[1] Εκλεκτον Hippocratis.

CONFECTIO AMYGDALÆ, Lond. Dub. *Confection of Almonds.*

"Take of sweet almonds, *eight ounces;* acacia gum in powder, *an ounce*; refined sugar, *an ounce.* Macerate the almonds in water to free them from their cuticle; then beat all the ingredients together until they be thoroughly incorporated."

This confection may be kept longer without spoiling, if the almonds, the acacia, and the sugar, be separately powdered, and afterwards mixed. Then whenever the confection is to be used, pound the ingredients together until thoroughly incorporated.

This preparation, which is not strictly a confection, but a paste, affords an easy and expeditious mode of preparing the almond mixture. A little of this paste, or the powder, triturated with a sufficient portion of water, immediately forms an emulsion. It may be made with bitter almonds. It should be strained through calico.

CONFECTIO AROMATICA, Lond. Dub. *Aromatic Confection.*

"Take of cinnamon bark, nutmegs, of each *two ounces;* cloves, *an ounce;* cardamoms, *half an ounce;* saffron, *two ounces;* prepared chalk, *sixteen ounces;* sugar, *two pounds.* Rub the dry substances mixed together into a very fine powder, and keep them in a close vessel; and when the confection is to be used, add water gradually, and mix until the whole be thoroughly incorporated."

ELECTUARIUM AROMATICUM, Edin. *Aromatic Electuary.*

"Take of the aromatic powder, *one part;* syrup of orange, *two parts.* Mix and beat them well together, so as to form an electuary."

In forming this combination the London College has now very properly ordered chalks to be used instead of shells: and to keep the ingredients in the form of powder. As a compound of aromatics it is stimulant and cordial. It is given with advantage in typhoid fevers, atonic gout, and nervous languors; either alone, in the form of bolus, or combined with camphor and syrup of orange-peel, in the form of mixture. This dose is from grs. x. to ʒj. or more.

CONFECTIO AURANTII, Lond. *Confection of Oranges.*

"Take of the external rind of the fresh orange, separated by rasping, *a pound;* sugar, *three pounds.* Beat the rind in a stone mortar with a wooden pestle; then add the sugar, and continue the beating until they be thoroughly incorporated."

CONSERVA CITRI AURANTII, Edin. *Conserve of Oranges.*

"Grate off the exterior rind of Seville oranges, beat it into a pulp, and during the beating add gradually three times its weight of refined sugar."

This confection is gently stomachic, and is a pleasant vehicle for the exhibition of tonic powders.

CONFECTIO CASSIÆ, Lond. *Confection of Cassia.*

"Take of fresh cassia pulp, *half a pound;* manna, *two ounces*; tamarind pulp, *an ounce;* syrup of roses, *eight fluid ounces.* Bruise the manna; then dissolve it in the syrup; afterwards mix in the Cassia and Tamarind pulps; evaporate down to a proper consistence."

ELECTUARIUM CASSIÆ FISTULÆ, Edin. *Electuary of Cassia.*

"Take of cassia pulp, *four parts;* tamarind pulp, manna, of each *one part;* syrup of damask roses, *four parts.* Bruise the manna in a mortar, and dissolve it in the syrup, by means of a gentle heat; then add the pulps, and by a continued heat reduce the mixture to a proper consistence."

ELECTUARIUM CASSIÆ, Dub. *Electuary of Cassia.*

"Take of freshly extracted cassia pulp, *half a pound;* manna, *two ounces;* tamarind pulp, *an ounce;* syrup of orange, *half a pound.* Bruise the manna; then dissolve it in the syrup by means of a moderate heat, and add the pulp; lastly, evaporate slowly the mixture to a proper consistence."

This electuary is gently laxative, and is used to relieve habitual costiveness; as a purge for children; and as a vehicle for the exhibition of other more powerful purgatives.

CONFECTIO OPII, Lond. Dub. *Confection of Opium.*

"Take of hard opium, powdered, *six drachms;* long pepper, *an ounce;* ginger root, *two ounces;* carraway, *three ounces;* tragacanth, powdered, *two drachms*; syrup, *sixteen fluid ounces.* Rub them together to a fine powder, and keep it in a close vessel. Whenever the confection is to be used, add *sixteen fluid ounces* of syrup, made hot, and mix.

ELECTUARIUM OPIATUM; olim, ELECTUARIUM THEBAICUM, Edin. *Opiate Electuary*; formerly, *Thebaic Electuary,*

"Take of aromatic powder, *six ounces*; Virginian snakeroot, in fine powder, *three ounces*; opium, diffused in a sufficient quantity of Spanish white wine, *half an ounce*; syrup of ginger, *a pound.* Mix, so as to make an electuary."

Syn. Electuaire Opiate (*F.*), Theriaklalwerge (*G.*), Elettuario Oppiato (*I.*).

The directions are curious; the syrup is ordered to be powdered with the other ingredients; and then we are told to mix f℥xvi. of syrup, whenever we use the confection. We presume the quantity of syrup used on such occasions may be left to the discretion of the practitioner.

The operation of the opium, in these preparations, is modified by the aromatics. They are intended as substitutes for the *mithridate* and *theriaca* of the old pharmacopœias, which were too long allowed to disgrace modern pharmacy. They are stimulant narcotics; and are usually employed in atonic gout, flatulent colic, and in diarrhœas, unattended by any inflammatory symptoms. Nine grains and one third of the dry London confection contain one grain of opium, and the same quantity is contained in forty-three of the Edinburgh electuary. The dose is from grs. v. to f ʒ ss.

CONFECTIO PIPERIS NIGRI, Lond. Dub. *Confection of Black Pepper.*

"Take of black pepper, elacampane-root, of each *one pound*; fennel seeds, *three pounds*; honey, sugar, of each *two pounds.* Rub together the dry ingredients to a fine powder; and whenever the composition is to be used add the honey, and beat the whole into one mass."

This preparation is a warm stimulant, and is intended as a substitute for Ward's paste in hæmorrhoids. The dose is from ʒ j. to ʒ ij.

ELECTUARIUM CATECHU COMPOSITUM, Edin. *Compound Electuary of Catechu.*

"Take of extract of catechu, *four ounces;* kino, *three ounces;* cinnamon bark, nutmegs, of each *one ounce;* opium, diffused in a sufficient quantity of Spanish white wine, *a drachm and a half;* syrup of red roses, boiled to the thickness of honey, *two pounds and a quarter.* Reduce the solid ingredients to powder; then mix them with the opium and syrup, so as to form an electuary."

Dublin.

"Take of catechu, *four ounces;* cinnamon bark, *two ounces;* kino, *three ounces;* rub them to powder, and add of hard refined opium diffused in Spanish white wine, *a drachm and a half;* syrup of ginger, boiled to the consistence of honey, *two pounds and a quarter.* Mix them."

These are useful combinations of astringents and aromatics; and may be efficaciously given in diarrhœas, and the last stage of dysentery, either in the form of bolus, or diffused in some distilled water. The dose is from ℈j. to ʒ ij. Ten scruples should contain one grain of opium: but this is rendered nearly inert by the tannin of the catechu.

CONFECTIO ROSÆ CANINÆ, Lond. *Confection of the Dog-Rose.*

"Take of pulp of the dog-rose, *a pound;* refined sugar in powder, *twenty ounces.* Expose the pulp of the Rose to a gentle heat, in an earthen vessel, then add the sugar, and rub them together until they be well incorporated."

CONSERVA ROSÆ CANINÆ, Edin. *Conserve of the Dog-Rose.*

"Take of the fresh fruit of the dog-rose, carefully freed from the seeds and inclosed spiculæ, beat it to a pulp, and while beating add gradually three times its weight of double-refined sugar."

CONFECTIO ROSÆ GALLICÆ, Lond. *Confection of the Red Rose.*

"Take of the petals of the red rose, *a pound;* refined sugar, *three pounds.* Beat the petals in a stone mortar; then add the sugar, and pound them again until the whole be thoroughly incorporated."

Edinburgh.

"Beat the unblown petals of the red rose to a pulp; and add during the beating three times their weight of refined sugar."

CONSERVA ROSÆ, Dub. *Conserve of Roses.*

"Beat the unblown petals of the red rose, freed from their claws; adding gradually three times their weight of refined sugar."

Syn. Conserve de Roses rouges (*F.*), Rosenconserve (*G.*), Conserva di Rose rosse (*I.*).

The directions of the London College are less minute than in the last pharmacopœia, which properly ordered the unblown petals freed from the calyx to be employed. This confection possesses a small degree of astringency; and, rubbed up in new milk, is employed as a tonic in early convalescence from acute diseases: but its chief use is to form a pleasant vehicle for more active remedies. It is, in solution, an excellent medium for exhibiting the sulphates of quina and of cinchonia, sulphate of magnesia, and the mineral acids.

CONFECTIO RUTÆ, Lond. Dub. *Confection of Rue.*

"Take of dried rue, carraway, laurel berries, of each, *an ounce and a half;* sagapenum, *half an ounce;* black pepper, *two drachms;* honey, *sixteen ounces.* Rub the dry articles together to a very fine powder, and preserve them. Then whenever the confection is to be used, add the honey, and mix the whole together."

This electuary possesses antispasmodic virtues. It is used in the form of enema only: from ℈j. to ʒ j., dissolved in O ss. of gruel, being administered in the convulsive affections of infants, and in flatulent colic.

CONFECTIO SCAMMONII[1], Lond. *Confection of Scammony.*

[1] Electuarium caryocostinum, P. L. 1720. Electuarium e scammonio, P. L. 1745. Electuarium scammonii, P. L. 1787.

"Take of scammony, powdered, *an ounce and a half;* bruised cloves, ginger, powdered, of each, *six drachms;* oil of carraway, *half a fluid drachm;* syrup of roses, *a sufficient quantity.* Rub the dry substances into a very fine powder, and preserve them; then whenever the confection is to be used add gradually the syrup, and rub again; lastly, after adding the oil of carraway, mix the whole together."

ELECTUARIUM SCAMMONII, Dub. *Electuary of Scammony.*

"Take of scammony in powder, *one ounce and a half;* cloves, bruised, ginger root, in powder, of each *six drachms;* oil of carraway, *half a drachm;* syrup of roses, *a sufficient quantity.* Mix the powder with the syrup; then add the oil of carraway, and mix the whole."

This is a stimulating cathartic; a drachm contains about twenty grains of scammony. It may be given in a dose of from grs. x. to ʒss. but it is seldom ordered.

CONFECTIO SENNÆ[1], Lond. *Confection of Senna.*

"Take of senna, *eight ounces;* figs, *a pound;* tamarind pulp, cassia pulp, the pulp of prunes, of each *half a pound;* coriander seeds, *four ounces;* liquorice, *three ounces;* sugar, *two pounds and a half;* water, *three pints.* Rub the senna with the coriander, and separate by sifting ten ounces of the mixed powder. Boil the water with the figs and liquorice added, until it be reduced one half; then press out and strain the liquor. Evaporate the strained liquor in a water bath, until twenty-four fluid ounces remain; then, the sugar being added, make a syrup. Finally, mix gradually the pulps with the syrup; and, having added the sifted powder, mix the whole together."

ELECTUARIUM SENNÆ COMPOSITUM, Edin. *Compound Electuary of Senna.*

"Take of senna leaves, *eight ounces;* coriander seeds, *four ounces;* liquorice root, bruised, *three ounces;* figs, pulp of prunes, of each *a pound;* pulp of tamarinds, *half a pound;* refined sugar, *two pounds and a half;* water, *four pounds.* Rub the senna with the coriander, and separate by sifting ten ounces of the mixed powder. Boil the residue with the figs and liquorice root in the water, down to one half; then express and strain. Evaporate the strained liquor to about a pound and a half. Add the sugar, and gradually the pulps; and, lastly, mix in the powder."

ELECTUARIUM SENNÆ, Dub. *Electuary of Senna.*

"Take of senna leaves in very fine powder, *four ounces;* pulp of prunes, *a pound;* pulp of tamarinds, *two ounces;*

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[1] Electuarium lenitivum, P. L. 1720. Electuarium sennæ, P. L. 1787.

molasses, *one pint and a half;* essential oil of carraway, *two drachms.* Boil the pulps with the syrup, to the thickness of honey; then add the powder, and when the mixture is nearly cold, the oil; finally, mix the whole thoroughly together."

Any of these electuaries, when properly prepared, is a mild and pleasant purgative, and well adapted for those who are afflicted with habitual costiveness; and for pregnant women. They are similar to the old *lenitive electuary.* The dose is from ʒij. to ʒiv. or more, taken at bed-time.

DECOCTA.

DECOCTIONS.

THESE are aqueous solutions of the active principles of vegetables obtained by boiling. They are intended to afford more powerful remedies than can be obtained by the simple infusion of the same substances in cold or even in boiling water; but, although, by the operation of boiling, the solvent power of the water is increased, and a greater quantity of the soluble parts of any vegetable body is consequently taken up by it, yet, it does not always follow, that the medicinal virtues of decoctions are greater than those of infusions. On the contrary, if the active principles of a plant be volatile, or if they consist chiefly of extractive matter, this form of preparation often renders the remedy altogether inert, either by dissipating the volatile matters, or by favouring the oxidizement of the extractive, which, in a continued temperature of 212°, attracts the oxygen of the atmosphere so rapidly, that it is soon converted into a soluble, insipid, inert matter, and precipitated in the fluid. This is the case with some substances, which are nevertheless ordered to be prepared in this form by the Colleges, and which we shall particularly notice in treating of the individual decoctions.

For making decoctions, the substances employed must be divided, if in the dry state, by pulverization, or, if fresh, by slicing, so as to expose an extended surface to the action of the water; which is thus enabled to take up their soluble principles in a shorter space of time; a circumstance, for the reasons already stated, of much importance in the preparation of decoctions. By covering the vessel in which they are made, the action of the air is prevented from affecting the ingredients; but there is reason for believing, that by long coction in water, even in covered vessels, the constituents of some vegetable bodies re-act upon one another, and produce entirely new compounds, possessed of properties altogether different from those which they previously contained. On this account, decoctions should be quickly made; and when aromatic or volatile ingredients are to enter into them, these should not be boiled with the more fixed substances, but the decoction, after it is made, should be poured over them, and allowed to remain covered up until it be nearly cold, before it is strained. In general, however, it is better to strain decoctions while they are hot through a sieve; for, as boiling water dissolves a larger proportion of vegetable matter than it can retain in solution at a lower temperature, a deposit almost always takes place as the decoction cools; and if this be of active matter it is lost by deferring the straining; whereas by straining the decoction while hot, the deposit can be mingled, by being shaken, with the clear fluid, when it enters into extemporaneous compositions, or when the dose of it is taken.

Decoctions, from the nature of their constituents, very soon ferment and spoil; consequently, they should be prepared in small quantities only, and never used, particularly in summer, forty-eight hours after they have been made.

DECOCTUM ALOES COMPOSITUM, Lond. Dub.

Compound Decoction of Aloes.

"Take of extract of liquorice, *seven drachms;* carbonate of potassa, *a drachm;* aloes powdered, myrrh powdered, saffron, of each *a drachm and a half;* compound tincture of cardamoms, *seven fluid ounces*; water, *a pint and a half.* Boil down the liquorice, carbonate of potassa, aloes, myrrh, and saffron, with the water, to a pint, and strain; then add the compound tincture of cardamoms.

By the addition of the alkali in this preparation, the water is enabled to hold in solution a greater portion of the aloes than it could otherwise hold, while another portion is suspended by the mucilage of the liquorice and the myrrh. The tincture prevents any spontaneous decomposition from taking place. The taste of the decoction is extremely nauseous, notwithstanding the bitter of the aloes is in some degree covered by the liquorice: but patients, even children, are soon reconciled to it; and in some instances it is preferred to all other purgatives simply on account of its flavour. It is decomposed, and precipitated by all the strong acids; bichloride of mercury, tartarized antimony, sulphate of zinc, and acetate and diacetate of lead; thence these substances are incompatible in formulæ with this decoction. It may be kept for a much longer time than any other decoction, without spoiling.

Medical properties and uses. — It is a warm cathartic, analagous in its action to the well-known *beaume de vie;* which, however, contained no alkali. It may be given with advantage in habitual costiveness, dyspepsia, hypochondriasis, jaundice, and chlorosis, in the dose of from f ℥ss. to f ℥ij. taken in the morning.

DECOCTUM ALTHÆÆ OFFICINALIS, Edin. *Decoction of Marsh Mallows.*

"Take of marsh-mallow root, dried and bruised, *four ounces;* rasins, stoned, *two ounces;* water, *seven pounds.* Boil down to five pounds; set aside the strained liquor until the dregs have subsided, and then decant it."

DECOCTUM ALTHÆÆ, Dub. *Decoction of Marsh Mallows.*

The same as the Edinburgh formula.

Marsh-mallow roots contain a considerable quantity of mucus, which is thus extracted unaltered by water. The simple decoction of the roots is viscid, of a pale-yellow colour, sweetish, and has a peculiar odour resembling that of boiled turnips. In the above preparation, the raisins increase its sweetness, and render it more palatable.

Medical properties and uses. — This decoction is a useful demulcent in visceral inflammations, calculous affections, gonorrhœa, strangury, and other diseases of the urinary organs. The dose is a cupful, frequently taken; but in inflammation of the urinary organs, and in similar cases, it may be drunk *ad libitum*, as a common beverage.

DECOCTUM ANTHEMIDIS NOBILIS, Edin. *Decoction of Chamomile.*

"Take of chamomile flowers, dried, *one ounce;* carraway seeds, bruised, *half an ounce;* water, *five pounds.* Boil for a quarter of an hour, and strain."

DECOCTUM CHAMÆMELI COMPOSITUM, Dub. *Compound Decoction of Chamomile.*

"Take of chamomile flowers, dried, *half an ounce;* fennel-seeds, *two drachms;* water, *a pint.* Boil a little, and strain."

These decoctions contain in solution bitter extractive, but, owing to the boiling, only a small portion of essential oil. Were their mode of preparation a matter of any consequence, we would recommend the aromatic seeds not to be added till towards the conclusion of the boiling: but for the purposes of fomentation and glyster, for which they are intended, as much benefit is probably derived from the warm water, as the principles it holds in solution.

DECOCTUM AMYLI[1], Lond. *Decoction of Starch.*

"Take of starch, *four drachms;* water, *a pint.* Rub the

[1] Mucilago *Amyli,* 1788 — 1824.

starch with the water gradually added, then boil for a short time."

The colourless or white starch only should be used for this decoction. It is administered as an enema in dysentery and excoriations of the rectum.

DECOCTUM CETRARIÆ[1], Lond. DECOCTUM LICHENIS ISLANDICI, Edin. *Decoction of Liverwort.*

"Take of liverwort, *five drachms;* water, *a pint and a half (two pounds*, Edin.). Boil down to a pint, and strain."

DECOCTUM LICHENIS ISLANDICI, Dub. *Decoction of Iceland liverwort.*

"Take of Iceland liverwort, *half an ounce;* boiling water, *a pint.* Digest for two hours; then boil for a quarter of an hour, and strain the liquor while it is hot."

In these decoctions the bitter principle of the lichen is united with 44 per cent. of *lichenin,* a modification of fecula, with lichenates of potassa and lime, phosphate of lime, gum, sugar, and extractive. It is so nauseous that few patients will be persuaded to take it in this form. The dose is from f ℥j. to f ℥iv. three times a day. The addition of f ʒij. of distilled vinegar, and ♏x. of tincture of opium, renders it very useful in phthisis.

DECOCTUM CHIMAPHILÆ, Lond. *Decoction of Winter-green or Pyrola.*

"Take of chimaphila, *one ounce;* distilled water, *a pint and a half.* Boil to a pint, and strain."

DECOCTUM PYROLÆ, Dub. *Decoction of Pyrola, Winter-green.*

"Take of pyrola umbellata, *one ounce;* water, *two pints.* Macerate for six hours, then take out the pyrola, and having bruised it, return it to the liquor. Reduce the mixture by evaporation to one pint, when expressed."

This decoction is a useful form of administering chimaphila in ascites and other dropsies connected with a broken-down constitution: its influence is aided by the addition of bitartrate of potassa. The dose is from f ℥j. to f ℥ij.

DECOCTUM CINCHONÆ CORDIFOLIÆ, Lond. *Decoction of Heart-leaved Cinchona.*

"Take of heart-leaved cinchona, bruised, *ten drachms;* distilled water, *a pint.* Boil for ten minutes in a lightly-covered vessel, and strain the liquor while it is hot."

DECOCTUM CINCHONÆ LANCIFOLIA[2], Lond. Edin. *Decoction of Lance-leaved Cinchona.*

DECOCTUM CINCHONÆ, Dub. *Decoction of Cinchona.*

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[1] Decoctum Lichenis, P. L. 1809—1824.
[2] Decoctum Cinchonæ, P. L. 1788—1824.

"Take of lance-leaved cinchona bark, in coarse powder, *an ounce;* water, enough to leave *a pint* after it is strained."

DECOCTUM CINCHONÆ OBLONGIFOLIÆ, Lond. *Decoction of Oblong-leaved Cinchona.*

This decoction is to be prepared in the same manner as that of heart-leaved cinchona.

Syn. Décoction de Quinquina (*F.*), Chinadekokte (*G.*), Decotto di China. (*I.*)

Cinchona bark is one of those substances which suffers by long coction with water; and therefore the Colleges have properly limited the time of boiling to ten minutes, and ordered the vessel to be covered, and the liquor to be strained while it is hot. As the strained decoctions cool, they become turbid, and let fall a reddish or yellowish powder, according to the kind of bark employed; this, however, must not be rejected, but diffused through the clear decoction when it is about to be used in compounding extemporaneous mixtures, or when the dose is to be taken. When the decoction is made with the lance-leaved cinchona, it contains kinates of cinchonia with a small proportion of kinate of quina; and on these salts its peculiar properties depend. When the yellow bark is used, the active principle is chiefly kinate of quina; both contain tannin and kinate of lime. The decoction of the red bark contains acidulous kinates of quina and of cinchonia, with more tannin than exists in the other two decoctions. By long boiling, says Pelletier, the tannin and starch form a compound insoluble in cold water, and which is, therefore in conjunction with colouring matter, kinate of lime, &c. precipitated as the decoction cools, and carries down also a portion of the cinchonia and quina; to remedy which Pelletier recommends a larger quantity of water to be used, and the decoction to be filtered and evaporated. This, however, is a tedious process; and, as sulphates of cinchonia and quina are very soluble, we are of opinion that the addition of f ʒj. of diluted sulphuric acid to the water for making the decoction will better answer this intention.

This decoction is more bitter, but less aromatic, than the infusion. It is affected by the same re-agents, and used in the same cases, and in similar doses, as the infusion. (See *Infusum Cinchonæ.*)

DECOCTUM CYDONIÆ[1], Lond. *Decoction of Quince Seeds.*

"Take of quince seeds, *two drachms;* water, *a pint.* Boil them over a gentle fire for ten minutes, then strain."

[1] This title would lead to the inference, that the preparation is a decoction of the quince, and not of the seeds. It should have been *Cydoniæ Seminum.* The old name *Mucilago Seminis Cydonii Mali,* P.L. 1788, was more correct than the present.

Quince seeds abound with mucus, which is extracted by boiling water. It is considerably viscid, transparent, nearly colourless, insipid, and inodorous. It is coagulated by alcohol, acids, and most of the metallic salts, which, therefore, are incompatible in formulæ with it; and it must be used as soon as it is made, for it soon spoils, owing perhaps to its containing some of the other constituents of the seeds.

Medical properties and uses.—This is often preferred to the other mucilages as a local demulcent in tenesmus, and in aphthous affections and excoriations of the mouth. A diluted solution of it injected beneath the eye-lids is useful for obtunding the acrimony of the discharge in violent inflammations of the eye.

DECOCTUM DAPHNES MEZEREI, Edin. Dub. *Decoction of Mezereon.*

"Take of the bark of mezereon root, *two drachms;* liquorice root, bruised, *half an ounce;* water, *three pounds.* Boil with a gentle fire down to two pounds, and strain."

Syn. Décoction de Daphne Mezereon (*F.*), Scioblbastrinde-dekokte (*G.*), Decotto di Daphne Mezereon (*I.*).

This decoction is slightly mucilaginous, and of a yellowish-brown colour; has the sweet taste of the liquorice root, with a slight degree of bitterness; and leaves in the mouth a sensation of heat and pungency, which, however, is scarcely felt until a few minutes after the dose has been swallowed.

Medical properties and uses.—This decoction was first made public by Dr. Alexander Russel[1] as an appropriate remedy for venereal nodes, arising from a thickening of the periosteum; and for removing those nocturnal pains with which venereal patients are afflicted. This opinion, however, has not been supported by experience; and Mr. Pearson[2] asserts, that it "has not the power of curing the venereal disease in any one stage, or any one form;" and adds, "except in an instance or two of lepra, in which the decoction conferred a temporary benefit, I have very seldom found it possessed of medicinal virtue, either in syphilis, or in the sequelæ of that disease, in scrofula, or in cutaneous affections." It has been given with seeming benefit in chronic rheumatism. The dose is from f ℥ iv. to f ℥ vj. three or four times a day.

DECOCTUM DULCAMARÆ, Lond. Dub. *Decoction of Woody Nightshade.*

"Take of the stalks of woody nightshade, sliced, *ten drachms;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

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[1] *Medical Observations and Enquiries,* vol. iii.

[2] *Pearson on the Remedies for Lues Venerea,* p. 47.

This decoction appears to have been introduced into the Pharmacopœia merely to fix the proportions of the ingredients. It has a strong, unpleasant odour, and a bitter, nauseous taste, followed by a degree of sweetness.

Medical properties and uses.—It is possessed of diuretic, diaphoretic, and narcotic properties; and has been found useful in humoral asthma and dropsy, and in lepra *vulgaris* and *alphos*, and ptyriasis, in conjunction with bichloride of mercury.

The dose is from f ʒiv. to f ℥j. combined with any aromatic tincture, given three times a day.

DECOCTUM GEOFFRŒÆ INERMIS, Edin. *Decoction of Cabbage-tree Bark.*

"Take of cabbage-tree bark, in powder, *one ounce;* water, *two pounds.* Boil with a gentle heat down to one pound, and strain."

This decoction has the colour of Maderia wine, a disagreeable odour, and a bitter mucilaginous taste. It is given to children in doses of f ʒij. and to adults to the amount of f ℥ij. An overdose, or the drinking cold water during its use, produces vomiting, fever, and delirium: effects which are to be remedied by castor oil, warm water, and acids. It is seldom employed in this country.

DECOCTUM GLYCYRRHIZÆ, Dub. *Decoction of Liquorice.*

"Take of bruised liquorice root, *one ounce and a half;* water, *one pint.* Boil for ten minutes, and strain."

DECOCTUM GRANATI, Lond. *Decoction of Pomegranate.*

"Take of pomegranate (rind) *two ounces;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

This is a useful and powerful astringent decoction. The root is a successful specific for tænia. (See Part ii. p. 601.)

DECOCTUM GUAIACI COMPOSITUM, Edin. Dub. *Compound Decoction of Guaiacum.*

"Take of guaiacum wood, rasped, *three ounces;* raisins, *two ounces;* sassafras root, sliced, liquorice root, bruised, of each *one ounce;* water, *ten pounds.* Boil the guaiacum wood and the raisins in the water over a gentle fire down to five pounds, adding the roots towards the end of the boiling; then strain."

Syn. Décoction de Guajac composée (*F.*), Guajack-dekokte (*G.*), Decotto di Guajaco composito (*I.*).

This decoction derives less of its efficacy from the guaiacum than is generally imagined, a small portion of the active matter only being taken up by the water. It is, however, supposed to be useful in chronic rheumatism, some cutaneous diseases, and in syphilis during a mercurial course; but, probably, at best it is only serviceable as a demulcent. It may be taken in doses of a quarter of a pint, to the amount of O j. or O ij. in the day.

DECOCTUM HÆMATOXYLI, Dub. *Decoction of Logwood.*

"Take of rasped logwood, *one ounce and a half;* cinnamon bark, bruised, *a drachm;* water, *two pints.* Boil the wood in the water, and evaporate the solution to a pint; towards the end of the boiling add the cinnamon bark, and strain."

This decoction is well suited to convey the tonic influence of the logwood. I have found it very serviceable in the diarrhœas of children connected with teething. The dose is f ʒ iv. to a child of a year old.

DECOCTUM HORDEI, Lond. Dub. DECOCTUM HORDEI DISTICHI, Edin. *Decoction of Barley.*

"Take of pearl barley, *two ounces and a half;* water, *four pints and a half* (*five pounds,* Edin.). First wash away with cold water, any extraneous substances that may adhere to the barley; then, having poured on it half a pint of water, boil for a little while. This water being thrown away, let the remainder be added boiling; then boil down to two pints, and strain."

DECOCTUM HORDEI COMPOSITUM, Lond. *Compound Decoction of Barley.*

"Take of decoction of barley, *two pints;* figs, sliced, *two ounces and a half;* liquorice (root), sliced and bruised, *five drachms;* raisins, (stoned,) *two ounces and a half;* water, *a pint.* Boil down to two pints, and strain."

Dublin.

"Take of decoction of barley, *four pints;* raisins stoned, figs sliced, of each *two ounces;* liquorice root, sliced and bruised, *half an ounce.* During the boiling add first the raisins, then the figs, and, lastly, the liquorice root a short time before it is finished: when it is completed, the strained liquor ought to measure two pints."

Syn. Décoction d'Orge (*F.*), Gerstedekokte (*G.*), Decotto d'Orzo (*I.*).

The preparation of these decoctions is generally intrusted to nurses and the attendants of the sick-room: but a practitioner ought not to be ignorant of the best manner of making them, as his directions may be occasionally necessary. They are elegant and useful demulcents, in cases of fever, phthisis, gonorrhœa, stranguary, and all acute diseases, given *ad libitum.* A few drops of tincture of opium may be added to the compound decoction, to obviate its laxative effect, where this might prove hurtful. Equal parts of this decoction, and of decoction of bark, form a useful gargle in cynanche maligna.

The simple decoction, mixed with an equal quantity of good milk and a small portion of sugar, is an excellent substitute for the breast milk in those cases in which infants are so unfortunate as to require being brought up with the spoon.

DECOCTUM MALVÆ COMPOSITUM, Lond. *Compound Decoction of Mallows.*[1]

Take of mallows, dried, *an ounce;* chamomile (flowers,) dried, *half an ounce;* water, *a pint.* Boil for a quarter of an hour, and strain."

This decoction is intended for fomentations and enemas, for which purposes it answers sufficiently well.

DECOCTUM PAPAVERIS, Lond. Dub. *Decoction of Poppy.*[2]

"Take of the capsules of the white poppy, bruised, *four ounces;* water, *four pints.* Boil for a quarter of an hour, and strain."

In making this decoction, the seeds should not be rejected, as they contain a considerable portion of bland oil, which, added to the mucilage and narcotic principle of the capsule, increases the emollient quality of the decoction. It is a useful fomentation in painful swellings, in excoriations produced by the thin acrid discharge of ulcers, and those common to infants. Its efficacy is promoted by the addition of f ℥vj. of distilled vinegar to the quantity of the decoction ordered.

DECOCTUM QUERCUS, Lond. DECOCTUM QUERCUS ROBORIS, Edin. *Decoction of Oak Bark.*

"Take of oak bark, *ten drachms;* distilled water, *two pints,* (*two pounds and a half,* Edin.) Boil down to a pint, and strain."

This decoction contains the greater part of the astringent matter of the bark. It is nearly inodorous, has a brown colour and an austere taste; reddens tincture of litmus, and is precipitated by solutions of isinglass, infusion of yellow cinchona bark, the carbonates of the alkalies, the aromatic spirit of ammonia, lime-water, and solutions of sulphate of iron, acetates of lead, bichloride of mercury, and sulphate of zinc, which are, therefore, incompatible in formulæ with it. The precipitates produced by the two last salts do not take place for a considerable time. It does not precipitate tartar emetic in solution.

Medical properties and uses. — This is the usual form under which oak bark is exhibited. As a local astringent, it is used as a gargle in cynanche and relaxation of the uvula; as an injection, in passive uterine hæmorrhages, epistaxis of

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[1] Decoctum pro enemate, P. L. 1787.
[2] Decoctum pro fomento, P. L. 1787.

aged persons, in leucorrhœa, and the gleety discharge which often remains after miscarriages. It is also an useful wash in piles and procidentia recti.

DECOCTUM SARSÆ, Lond.[1] Dub. *Decoction of Sarsaparilla.*

"Take of sarsaparilla root, sliced, *five ounces;* boiling distilled water, *four pints.* Macerate for four hours in a vessel lightly covered, and placed near the fire; then take out the sarsaparilla, and bruise it. Return the bruised root again to the liquor, and macerate in a similar manner for two hours. Afterwards boil it down to two pints, and strain."

DECOCTUM SMILACIS SARSAPARILLÆ, Edin. *Decoction of Sarsaparilla.*

"Take of sarsaparilla, sliced, *six ounces;* water, *eight pounds.* Digest for two hours in a temperature of about 195°; then take out the root and bruise it: in this state put it again into the liquor, and boil it with a gentle fire down to four pounds; then express it, and strain."

Syn. Décoction de Sarsaparille (*F.*), Sarsaparille-dekokte (*S.*), Decotto di Sarsaparilla (*I.*).

We have already stated the claims which sarsaparilla has to the attention of the practitioner as a remedy in syphilis. The above formulæ display a great deficiency of enquiry in those who introduced them into the pharmacopœias; for, as the whole of the active matter of the root resides in the cortical part, and can be extracted from this by moderate coction, there is no necessity for the various macerations and boilings ordered by the Colleges; which, in fact, injure the remedy. The entire root, merely bruised, and macerated in water at 180° Fahr., yields up all its medicinal properties.[2] This decoction may be regarded as useful during the exhibition of mercury; and is found to be so in dysuria, and incontinence of urine arising from a morbid irritability of the bladder. It affords precipitates with lime-water, solution of chloride of barium, and of acetate of lead, which are incompatible in formulæ with it.

DECOCTUM SARSAPARILLÆ COMPOSITUM, Lond. Dub. *Compound Decoction of Sarsaparilla.*

"Take of decoction of sarsaparilla, boiling, *four pints;*

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[1] The Lisbon sarsaparilla has long been esteemed the best; but from the experiments of the late Mr. Pope (See *Trans. of the Medico-Chirurg. Soc.*) it appears that the red sarsaparilla, which is an uncultivated species collected on the Spanish Main, is superior both in the quantity of extract which it yields and the medicinal virtues of that extract.

[2] The profession is indebted to Mr. Batley, of Fore Street, for his remarks on this subject. See *London Med Repos.*, vol. xi. 130; but more particularly to the late Mr. Pope, of Oxford Street. See *Trans. of the Medico-Chirurg. Soc. of London*, vol. xii. p. 344.

sassafras chips, guaiacum, rasped, liquorice root, bruised, of each *ten drachms;* mezereon, *three drachms.* Boil for a quarter of an hour, and strain."

This decoction is an imitation of the once celebrated *Lisbon diet drink.* Some of its efficacy depends on the mezereon root bark. It operates as a diaphoretic and alterative, and is found to be useful in the treatment of secondary syphilis, chronic rheumatism, and in lepra, and some other cutaneous affections. The dose is from f ℥iv. to ℥vj. taken three or four times a day.

DECOCTUM SCOPARII COMPOSITUM, Lond. *Compound Decoction of Broom.*

"Take of broom, juniper berries (fruit), dandelion (root), *of each an ounce;* water, *a pint and a half.* Boil down to a pint, and strain."

This decoction possesses diuretic properties; and is a good vehicle for bitartrate of potassa in ascites. The dose is from f ℥ij. to f ℥vj. three times a day.

DECOCTUM SENEGÆ, Lond. Dub. DECOCTUM POLYGALÆ SENEGÆ, Edin. *Decoction of Seneka.*

"Take of seneka root, *ten drachms;* distilled water, *two pints.* Boil down to a pint, and strain."

Syn. Décoction de Polygale Senègæ (*F.*), Senegawurzel-dekokte (*G.*), Decotto di Polygala Senega (*I.*).

This decoction is of a brownish olive colour, inodorous, and has a hot, pungent taste. Its virtues are supposed to depend on senegin, a new principle, neither acid nor alkaline. (See Part ii.). The dose is from f ℥jss. to f ℥iij. taken three or four times a day.

DECOCTUM TARAXACI, Dub. *Decoction of Dandelion.*

"Take of the fresh herb and roots of dandelion, *four ounces;* water, *two pounds.* Boil to one pound, and strain the expressed fluid." By decoction, water takes up the whole of the active principles of the taraxacum. When the bowels are sluggish, or there are serous deposits, I have found the addition of the bitartrate of potassa greatly improve the efficacy of this decoction. Much depends on the time of digging up the roots. In the autumn they are full of milky juice, and are much more active than in spring. The dose is from f ℥ij. to f ℥iij. twice a day.

DECOCTUM TORMENTILLÆ, Lond. *Decoction of Tormentil.*

"Take of tormentil, bruised, *two ounces;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

This is a useful form for administering this powerful astringent. The dose is from f ℥ss. to ℥jss.

DECOCTUM ULMI, Lond. Dub. DECOCTUM ULMI CAMPESTRIS, Edin. *Decoction of Elm Bark.*

"Take of fresh elm bark, bruised, *two ounces and a half;* water, *two pints* (*five pints,* Edin.) Boil to a pint, and strain."

This decoction is thick, slightly mucilaginous, and of a brown colour; has a faint odour, and a bitterish taste. Alcohol added to it produces a precipitate of light brown flakes; tinctures, therefore, in any considerable quantity, are inadmissible in formulæ with it. Its medicinal properties have been already noticed. (See *Ulmus,* Part ii.) The dose is from f ℥ iv. to f ℥ vj. taken twice or three times a day.

DECOCTUM UVÆ URSI, Lond. *Decoction of Whortleberry.*

"Take of whortleberry (leaves), *an ounce;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

This decoction is a good form for administering whortleberry. It has been employed in phthisis and in purulent affections of the urinary organs. The dose is from f ʒ iv. to f ℥ ij.

DECOCTUM VERATRI, Lond. Dub. *Decoction of White Hellebore.*

"Take of white hellebore bruised, *ten drachms;* distilled water, *two pints;* rectified spirit, *three fluid ounces.* Boil the hellebore root in the water down to a pint, and when the decoction is cold, add the spirit, and press and strain."

This decoction, which contains a gallate of veratria, is stimulant, acrid, and cathartic; but its operation is too violent for internal use. As a lotion it often proves beneficial in scabies, tinea capitis, and other cutaneous eruptions; but it requires to be used with caution, even as an external remedy.

EMPLASTRA.

PLASTERS.

THESE are solid, tenacious compounds, adhesive in the ordinary heat of the human body. The base of the majority of plasters is a chemical combination of the semivitreous oxide of lead and oil; but some of them owe their consistence to wax and resin; and others contain no oily nor fatty matter whatsoever. Deyeux proposes[1] to confine the name of plas-

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[1] *Annales de Chimie,* xxxiii. 52.

ters to the combinations of metallic oxides with oils or fat; and to give those not containing oxides the term solid ointments; but this definition would include among the plasters some of the ointments, and exclude many of the plasters.

Plasters should not adhere to the hand when cold; they should be easily spread when heated; and should remain tenacious and pliant after they are spread; but should not be so soft as to run when heated by the skin. All plasters become too consistent and brittle when long kept; but in this case, those which are unctuous may be re-melted by a gentle heat, and some oil added to them. They are usually formed into rolls, which are wrapped in paper; and when they are to be used, they are melted and spread on leather, calico, linen, or silk. Those which contain metallic oxides ought to be melted by boiling water, for in a greater degree of heat the fatty matter is apt to reduce the oxide.

Plasters are employed as local remedies to answer various indications. When the materials of which they are formed are soft and bland, they are used simply as coverings to sores and abraded surfaces, to protect them from the action of the air, and give support to the parts; but in many instances they contain acrid and stimulating substances, and operate as rubefacients or as blisters.

EMPLASTRUM AMMONIACI, Lond. Edin. Dub. *Ammoniacum Plaster.*

"Take of ammoniacum, *five ounces;* distilled vinegar, *eight fluid ounces.* Dissolve the ammoniacum in the vinegar; then evaporate the solution with a slow fire, constantly stirring, until it acquire a proper consistence."

This plaster is stimulant and resolvent. It is applied to scrofulous and indolent tumours and white swellings.

EMPLASTRUM AMMONIACI, CUM HYDRARGYRO, Lond. *Ammoniac Plaster, with Mercury.*

"Take of ammoniacum, *a pound;* mercury, *three ounces;* olive oil, *a fluid drachm;* sulphur, *eight grains.* Add the sulphur gradually to the heated oil, stirring constantly with a spatula until they unite; then rub the mercury with them until the globules disappear; lastly, add gradually the ammoniacum melted, and mix the whole together."

Dublin.

"Take of pure gum ammoniacum, *a pound;* purified mercury, *three ounces;* turpentine, *two drachms.* Rub the mercury with the turpentine until the globules disappear; then add gradually the ammoniacum, previously melted, and melt the whole together."

In these plasters the mercury is probably in the state of oxide with a minimum of oxygen. They are discutients, and are applied to indurated glands, hydarthus, nodes, tophi, and indolent tumours.

EMPLASTRUM AROMATICUM, Dublin. *Aromatic Plaster.*

"Take of frankincense, *three ounces;* yellow wax, *half an ounce;* cinnamon bark in powder, *six drachms;* oil of pimenta, oil of lemons, of each *two drachms.* Melt the frankincense and the wax together, and strain the mixture; when it thickens by cooling, mix with it the powder of cinnamon previously rubbed with the oils, and form them into a plaster."

This plaster, which is an elegant stimulant, is applied on the region of the stomach in dyspepsia, to allay pain and vomiting, and to expel flatus. As the oils are very volatile, it must be spread with the thumb, without being melted. It requires to be frequently renewed.

EMPLASTRUM ASSAFŒTIDÆ, Edin. *Assafœtida Plaster.*

"Take of plaster of semivitreous oxide of lead, assafœtida, of each *two parts;* galbanum, yellow wax, of each *one part.*"

This plaster is sometimes applied over the umbilical region, in flatulence and hysteria.

EMPLASTRUM BELLADONNÆ, Lond. Dub. *Plaster of Belladonna.*

"Take of plaster of resin, *three ounces;* extract of belladonna, *an ounce and a half.* Add the extract to the plaster, melted by the heat of a water bath, and mix."

This is an useful local application in cases of chronic pains, and applied to the sacrum in dysmenorrhœa.

EMPLASTRUM CALEFACIENS, Dub. *Warm Plaster.*

"Take of plaster of cantharides, *one part;* Burgundy pitch, *seven parts.* Melt them together with a moderate heat, and mix them so as to form a plaster."

This plaster is stimulant and rubefacient, and is applied with advantage in bronchitis, hooping-cough, sciatica, and local pains. The proportion of plaster of cantharides is rather too great, as it seldom fails to blister or produce a running sore, in many persons.

EMPLASTRUM CANTHARIDIS, Lond. *Blistering Plaster.*

"Take of cantharides, rubbed to a very fine powder, *a pound;* wax plaster, *a pound and a half;* prepared lard, *a pound.* Sprinkle the cantharides in the plaster and the lard, melted together and removed from the fire when just about to become solid, and mix the whole together."

EMPLASTRUM CANTHARIDIS VESICATORIÆ, Edin. *Blistering Plaster.*

"Take of mutton suet, wax, white resin, blistering flies, reduced to a very fine powder, of each *equal weights.* Mix the powder with the other articles previously melted together, and removed from the fire; then stir until the mixture stiffens in cooling."

EMPLASTRUM CANTHARIDIS, Dub. *Blistering Plaster.*

"Take of purified yellow wax, mutton suet, of each *a pound;* yellow resin, *four ounces;* blistering flies, in fine powder, *a pound.* Melt the wax, the suet, and the resin together, and a little before they concrete in becoming cold, sprinkle in the blistering flies, and form the whole into a plaster."

Syn. Emplâtre de Cantharides (*F.*), Kanthariden pflaster (*G.*), Emplastro di Cantarelle (*I.*).

These plasters are of a moderately soft consistence, so as to admit of being spread without the assistance of heat, which detroys the acrimony and epispastic property of the flies: they seldom fail of raising a blister if the cantharides be good, and have not been added when the other ingredients were too hot. When they are to be used, a piece of leather, of a proper shape and size, is first spread with adhesive plaster, and over this the blistering plaster is extended, of a moderate degree of thickness and as smooth as possible, by means of the thumb; a proper margin being left, so as to enable it to adhere closely to the skin; but a blistering plaster should not be bandaged down. There is, however, in this method of using cantharides, a waste of flies, as those only which are on the surface of the plaster, when it is spread, act on the skin; and it has been suggested by Parmentier[1], that the same effect would be more economically produced by sprinkling the powdered flies on a piece of farinaceous paste, spread on linen or leather. Blistering plasters require to remain applied for twelve hours, to raise a perfect blister; they are then to be removed, the vesicle is to be cut at the most depending part, and, without removing the cuticle, the vesicated part is to be dressed with simple cerate or spermaceti ointment, spread on *lint*; and the old cuticle allowed to remain until a new one is formed under it, when it peels off, and the whole is healed in the course of a few days. The application of these plasters, however, is sometimes attended with strangury and bloody urine, which arise from the canthariden being absorbed, and irritating the kidneys and urethra. This effect is much increased if the blister be applied over an abraded surface, as, for example, on the head immediately after it has been shaved; and it also occurs if the plaster

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[1] *Annales de Chimie,* xlviii.

remain too long applied. To prevent strangury, camphor has been recommended to be mixed with the blistering composition, but it has no good effect; and the action on the urinary organs is better obviated by copious dilution with milk, or mucilaginous fluids, and fomentations of warm milk and water to the blistered part, after the removal of the plaster. When the head is the part intended to be blistered, it should be shaved at least ten hours before the plaster is applied; and it is a good rule to interpose a thin piece of gauze, wetted with vinegar, between the vesicatory and the skin, applied smooth and very close over the plaster.

In persons of delicate habits, and those labouring under some diseases of irritation, particularly children, the blistered part, instead of healing kindly, becomes a spreading sore: the cutis vera is destroyed, and the part cannot be healed until the irritability of habit which induced this unpleasant state is allayed. In such cases, the blistering plaster should not be allowed to remain on longer than is requisite to raise the cuticle: but if ulceration have commenced, the best local application is a warm emollient poultice; and bathing the denuded surface frequently with tepid milk and water; while at the same time cinchona bark is internally administered.

EMPLASTRUM CANTHARIDIS VESICATORIÆ COMPOSITUM, Edin. *Compound Plaster of Spanish Flies.*

"Take of Venice turpentine, *eighteen parts;* Burgundy pitch, blistering flies, of each *twelve parts;* yellow wax, *four parts;* subacetate of copper, *two parts;* white mustard seeds, black pepper, of each *one part.* Melt the Burgundy pitch and the wax, and add to them the turpentine. While these remain still warm, after being melted, sprinkle in the other ingredients, reduced to fine powder, and mix them, stirring constantly, so as to form a plaster."

This plaster is intended to raise a blister more quickly than the former: thence it is adapted for cases of gout and cramps of the stomach, in which the effect of the blister must be almost instantly produced. Its operation is accompanied with great pain, and a pungent sense of heat: it is apt to cause very unpleasant ulceration if allowed to remain too long applied.[1]

EMPLASTRUM CERÆ, Lond. *Wax Plaster.*

"Take of wax, suet, of each *three pounds;* resin, *a pound.* Melt them together, and strain."

EMPLASTRUM SIMPLEX, Edin. *Simple Plaster.*

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[1] Blisters are rapidly raised by a solution made by digesting cantharides in acetic æther, in the proportion of ʒj. of the powdered flies to f℥j. of the æther. They are still more quickly raised by the application of boiling water.

"Take of yellow wax, *three parts;* mutton suet, white resin, of each *two parts.*"

These plasters were originally intended for dressing blistered parts, with the view of promoting a discharge; but, owing to the pain and irritation they induce, they are now seldom employed.

Officinal preparation. — *Emplastrum Cantharidis*, L.

EMPLASTRUM GALBANI, Lond. *Galbanum Plaster.*

"Take of galbanum, *eight ounces;* plaster of lead, *three pounds;* common turpentine, *ten drachms;* resin of the spruce-fir, powdered, *three ounces.* Add first the resin of the spruce-fir, then the plaster of lead, melted with a slow fire, to the galbanum and turpentine melted together, and mix the whole together."

EMPLASTRUM GUMMOSUM, Edin. *Gum Plaster.*

"Take of plaster of semivitreous oxide of lead, *eight parts;* ammoniacum gum-resin, galbanum, yellow wax, of each *one part.* Add the gum resins to the melted plaster and wax, and mix."

EMPLASTRUM GALBANI, Dub. *Plaster of Galbanum.*

"Take of litharge plaster, *two pounds;* galbanum, *half a pound;* yellow wax, sliced, *four ounces.* To the galbanum melted by heat, add the litharge plaster and the wax; then melt the whole together by a gentle heat."

These plasters are stimulant and suppurative. They are applied with advantage to scrofulous tumours; to joints long affected with arthritic pains; and to the loins in rickets; as a suppurative to excite indolent tumours, and reduce the induration which often remains around discharged abscesses.

EMPLASTRUM HYDRARGYRI, Lond. *Mercurial Plaster.*

"Take of mercury, *three ounces;* plaster of lead, *a pound;* olive oil, *a fluid drachm;* sulphur, *eight grains.* Add the sulphur gradually to the heated oil, stirring constantly with a spatula until they unite; afterwards rub the mercury with them until the globules disappear; then add by degrees the lead plaster melted with a slow fire, and mix the whole."

Edinburgh.

"Take of olive oil, resin, of each *one part;* mercury, *three parts;* plaster of semivitreous oxide of lead, *six parts.* Rub the mercury with the oil and the resin previously melted together, and cooled, until the globules disappear; then add gradually the plaster of semivitreous oxide of lead melted, and let the whole be carefully mixed together."

Syn. Quecksilberpflaster (*G.*).

The mercury in these plasters is supposed to be in the state of oxide, with a minimum of oxygen; and the sulphur and oil, are intended to diminish the labour required for this oxidizement of the metal. The plasters are powerful discutients, and are applied to buboes, venereal tumours, nodes, when they are not very painful to the touch, and indurations; they are also applied to joints affected with obstinate syphilitic pains.

EMPLASTRUM OPII, Lond. Edin. *Plaster of Opium.*

"Take of hard opium, powdered, *half an ounce;* resin of the spruce-fir, powdered, *three ounces;* lead plaster, *a pound;* water, *eight fluid ounces.* Add the resin of the spruce-fir, the opium, and the water, to the melted plaster, and with a slow fire boil down, until all unite into a proper consistence."

Syn. Opiumspflaster (*G.*).

This plaster is anodyne, and supposed to be useful in relieving rheumatism and local pains: but although it is undoubtedly certain that opium, in that state in which it exists in the tincture, or when it is dissolved in oil, produces an anodyne effect on the system when externally applied, yet we doubt whether the anodyne properties of this plaster are such as to sanction its employment.

EMPLASTRUM OXIDI FERRI RUBRI, Edin. *Plaster of Red Oxide of Iron.*

"Take of plaster of semivitreous oxide of lead, *twenty-four parts;* white resin, *six parts;* yellow wax, olive oil, of each *three parts;* red oxide of iron, *eight parts.* Rub the red oxide of iron with the oil, and adding the other ingredients melted, mix the whole well together."

EMPLASTRUM THURIS, Dub. *Plaster of Frankincense.*

"Take of litharge plaster, *two pounds*; frankincense, *half a pound*; red oxide of iron, *three ounces.* To the plaster and frankincense, melted together, add the oxide, stirring them together so as to form a plaster."

These plasters are supposed to be tonic, and are used in muscular relaxations, and weakness of the joints after sprains; but they act by affording mechanical support to the parts.

EMPLASTRUM PICIS,[1] Lond. *Compound Pitch Plaster.*

"Take of Burgundy pitch, *two pounds;* resin of the spruce-fir, *a pound;* resin, wax, of each *four ounces;* expressed oil of nutmeg, *an ounce;* olive oil, water, of each *two fluid ounces.* Add first the resin of the spruce-fir, then the oil of nutmeg, the olive oil, and the water, to the pitch, resin, and wax, melted together. Lastly, mix the whole, and boil down to a proper consistence."

This plaster is stimulant and rubefacient. It is used in

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[1] Emplastrum Picis compositum, P. L. 1824.

pulmonary affections, applied to the thorax; and in headache and chronic ophthalmia, applied to the temples. When a serous exudation takes place, the plaster should be frequently renewed.

EMPLASTRUM PLUMBI, Lond. *Lead Plaster.*

"Take of oxide of lead, rubbed to a very fine powder, *six pounds;* olive oil, *a gallon;* water, *two pints.* Boil them together over a slow fire, stirring constantly until the oil and oxide of lead cohere into the consistence of a plaster. It will be necessary, however, to add a little boiling water, if that which was employed in the beginning shall be consumed before the end of the process."

EMPLASTRUM OXIDI PLUMBI SEMI-VITREI, Edin. *Plaster of Semivitreous Oxide of Lead.*

"Take of the semivitreous oxide of lead, *one part;* olive oil, *two parts;* water, *a sufficient quantity.* Boil them, stirring constantly, until the oil and the oxide unite into a plaster."

EMPLASTRUM LITHARGYRI, Dub. *Litharge Plaster.*

"Take of litharge in fine powder, *five pounds;* olive oil, *nine pounds;* boiling water, *two pints.* Mix them at a high temperature, constantly stirring until the oil and the litharge unite so as to form a plaster; supplying occasionally any waste of water that may take place."

Syn. Emplâtre de diachylon (*F.*), Bleipflaster (*G.*).

The use of the water in the formation of these plasters is to moderate the heat of the mixture, until the oil and the oxide combine, by which means the reduction of the metal is prevented; a circumstance which is apt to take place from the strong attraction of the oil for oxygen at a high temperature. By continuing the boiling, the water is dissipated; and the temperature can then be increased to a sufficient degree to give the plaster the necessary consistence. The water should be previously made hot; as cold water is apt to produce an explosion. When long kept, these plasters change their colour, and lose most of their sensible properties. They are intended chiefly to defend excoriated surfaces from the action of the air; and to form the basis of some other plasters.

Officinal preparations. — *Emplastrum Hydrargyri,* L. E. *Emplastrum Opii,* L. *Emplastrum Assafœtidæ,* E. *Emplastrum gummosum,* E. *Emplastrum Galbani,* L. D. *Emplastrum Oxidi Ferri rubri,* E. *Emplastrum Resinæ,* L. E. D. *Emplastrum Saponis,* L. E. D. *Emplastrum Thuris,* D.

EMPLASTRUM RESINÆ, Lond. *Resin Plaster.*

"Take of resin, *half a pound;* lead plaster, *three pounds.* Melt the lead plaster with a gentle heat; then add the resin in powder, and mix."

EMPLASTRUM RESINOSUM, Edin. *Resinous Plaster.*

"Take of plaster of semivitreous oxide of lead, *five parts;* resin, *one part.* Melt them with a gentle heat; then continue stirring the mixture until it becomes stiff in cooling."

EMPLASTRUM LITHARGYRI CUM RESINA, Dub. *Litharge Plaster, with Resin.*

"Take of litharge plaster, *three pounds and a half;* yellow resin, *half a pound.* Melt the litharge plaster by a moderate heat; then add the resin reduced to a very fine powder, that it may melt quickly, and form a plaster."

Syn. Harzigtes Bleipflaster (*G.*).

These plasters are defensive, adhesive, and gently stimulant. They are used for retaining together the lips of recent wounds, when it is wished to heal them by the first intention; to support ulcerated parts; and to assist their granulation and cicatrization, according to the excellent method of Mr. Baynton. The plaster, however, originally used by Mr. Baynton, contained less resin; ℥ vj. only being added to lb. j. of the litharge plaster; but this preparation answers the purpose equally well, except in very irritable habits. The best substance for spreading it on is calico; and it is of some importance to spread it equally, and thin; to effect which the calico mus tbe stretched, and the plaster, melted and beginning to cool, must be poured on one end of it, and equally extended over the whole surface by means of a spatula, held nearly horizontally, with one edge of the blade raised to an angle of 45 degrees: or it may be still more equally done by passing the calico, on which the fluid plaster has been poured, through a machine formed of a straight blade of steel, fixed by screws, at a proper distance from a polished plate of the same metal. It is sold ready spread.

EMPLASTRUM SAPONIS, Lond. Dub. *Soap Plaster.*

"Take of soap, sliced, *half a pound;* lead plaster, *three pounds.* Mix the soap with the melted plaster; then boil to a proper consistence."

EMPLASTRUM SAPONACEUM, Edin. *Soap Plaster.*

"Take of semivitreous oxide of lead, *four parts;* gum plaster, *two parts;* soap, sliced, *one part.* Mix the soap with the plasters melted together; then boil them a little, so as to form a plaster."

Syn, Seifenpflaster (*G.*).

Dr. Powell properly observes, that the soap plaster of the London College "must be formed into rolls, when it begins to thicken, for afterwards, although it be still somewhat soft, it loses its tenacity, and will break to pieces."[1]

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[1] *Powell's Translation of the London Pharmacopœia,* 2d edit. 324.

Soap plaster is discutient; and is applied to lymphatic tumours: but it is much less useful than the mercurial plaster.

EMPLASTRUM SAPONIS COMPOSITUM, vel ADHERENS, Dub. *Compound Soap Plaster.*

"Take of soap plaster, *two ounces;* litharge plaster with resin, *three ounces.* Let a plaster be made, which when softened by heat can be spread on linen."

An excellent plaster for bandaging sore legs.

ENEMATA.

ENEMA CATHARTICUM, Dub. *Purging Clyster.*

"Take of manna, *an ounce;* dissolve it in compound decoction of chamomile, *ten fluid ounces;* then add of olive oil, *an ounce;* sulphate of magnesia, *half an ounce.* Mix them."

ENEMA FŒTIDUM, Dub. *Fœtid Clyster.*

"It is to be prepared by adding to the purging clyster *two drachms* of assafœtida."

ENEMA OPII, Lond. Dub. *Clyster of Opium.*

"Take of tincture of opium, *thirty minims;* (opium, *one grain,* Dub.) decoction of starch, *four fluid ounces;* (tepid water, *six ounces,* Dub.) Mix."

The only use of this formula is to fix the quantity of the opium and the fluid.

ENEMA TEREBINTHINÆ, Lond. *Clyster of Turpentine.*

"Take of oil of turpentine, *a fluid ounce;* yolk of egg, *a sufficient quantity.* Rub them together, and add decoction of barley, *nineteen fluid ounces.* Mix."

ENEMA TEREBINTHINÆ, Dub. *Clyster of Turpentine.*

"Take of common turpentine, *half an ounce;* the yolk of one egg; rub them together, and add gradually water of a temperature not exceeding 100°, *ten ounces.*"

This is a useful clyster in cases of peritonitis, and in erysipelas of the head. It has been proposed to substitute half a pint of olive oil for the barley water, in cases of ascarides.[1] The oil of olives alone is a useful enema in such cases.

ENEMA TABACI, Lond. *Clyster of Tobacco.*

"Take of tobacco, *a drachm;* boiling water, *a pint.* Macerate for an hour, and strain."

Much caution is required in using this powerful sedative enema: if it depress too much, solution of ammonia and brandy should be freely administered.

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[1] Collier's Trans. of the New Pharm., p. 190.

EXTRACTA.

EXTRACTS.[1]

THESE are preparations obtained by evaporating aqueous and alcoholic solutions of vegetable substances, until a mass of a somewhat firm, tenacious consistence remains. When water has been employed for making the solution, the extract may consist of gum or mucilage, albumen, extractive and saccharine matter, in conjunction with the active principles, and other salts which the vegetable contained, and is termed a *Watery Extract;* but if alcohol have been the menstruum, resin, extractive, and all the above matters, except gum, may be the ingredients, and the extract is denominated a *Spirituous Extract.* The latter appellation also is used if proof spirit be employed. The proper menstruum, therefore, for the preparation of any extract, must be that fluid which most readily dissolves the peculiar principles on which the medicinal efficacy of the vegetable is supposed to depend.

When water is employed, the substance to be subjected to its action should be in the dried state, and coarsely powdered; and the solution, whether made by decoction or infusion, should be evaporated immediately after it is strained, and whilst it is yet hot; for, as we observed in treating of decoctions, water at the temperature of 212° takes up much more of the active matter of vegetables than it can hold in solution at a lower temperature; therefore by allowing them to cool, with the view of defecation, and evaporating the clear fluid only, a considerable portion of the active matter does not enter into the extract, and is necessarily lost. In performing the evaporation, a higher temperature than that of boiling water must not be employed; but it must, nevertheless, be conducted as quickly as possible; and, therefore, the evaporating vessel should be broad and shallow, and set in boiling water; or the water bath recommended by Dr. Powell[2] should be employed. (See *Instruments*, Part i.) The method of preparing extracts in vacuo introduced by Mr. Barry, is a great improvement; and certainly, if the presence of air is likely to alter the properties of extracts, considerable advantages will accrue from Mr. Barry's mode of conducting the evaporation.[3]

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[1] Chemists are much divided as to the nature of the substances to which the term *Extract* can be chemically applied; the term, therefore, as used in this work and in the pharmacopœias, is confined solely to preparations obtained in the manner described under the title, without reference to their chemical properties.

[2] *Translation of the London Pharmacopœia,* p. 201.

[3] For a description of the apparatus Mr. Barry employs, see *Journal of Science and the Arts,* vol. viii. p. 360.

Alcohol is used only in cases where the active ingredient of the vegetable is chiefly resin, or where it is too volatile to bear the heat which is necessary for evaporating the water without being dissipated, or without suffering some decomposition, which would materially alter its properties. A tincture of the substance is first obtained, which is then evaporated by a very gentle heat in a water bath; but the alcohol need not be allowed to evaporate in the air, as by employing a distilling apparatus the greater part of it is again obtained, either altogether free from any vegetable matter, or containing a small portion only of the more volatile principle; which renders it fitter for being again employed for the preparation of the same kind of extract.

Whether water, proof spirit, or pure alcohol be employed, the medicinal properties of the extract are always in some degree injured; the volatile parts are dissipated, and some of the fixed parts decomposed by the degree of heat required for the evaporation,—particularly if water be the menstruum; or the proper extractive is oxidized, and consequently rendered inert. Such are some of the objections to these preparations, as they are usually found in the shops; but well prepared, they are excellent medicines. As a general rule, they should be made by expressing the juice from the recently gathered vegetable, just getting into full flower, and inspissating this expressed juice as rapidly as possible by exposing it in thin strata to a current of very dry air. Practical experiments have fully demonstrated the advantage this process posseses over all others at present in use; for it was shown that 10 grains of conium extract, thus prepared, were more than equal to 20 grains of that prepared in vacuo, and more than equal to 60 grains of that prepared by the process of boiling down the juice to an extract.[1]

Extracts require to be kept in a hard and a soft state. A hard extract should be in such a state as to admit of its being easily pulverized, and the soft extract should be such as to retain the round form of a pill, without the addition of any powder. Both kinds should be preserved in pots which are so close that all the external air can be excluded; and these should be kept in a dry place. The soft should be wrapped in oiled bladder, and kept also in close covered pots.

The London College does not arrange the extracts under the titles, *Watery* and *Spirituous*, which is the arrangement of the Edinburgh College; nor does it distinguish them by the terms *Simple* and *Resinous*, in the manner of the Dublin

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[1] The best extracts which I have seen are prepared in this manner by Mr. Squires of Oxford Street, the Chemist to the Queen.

Pharmacopœia. It classes the inspissated juices, which require no menstrua as extracts. The following general directions are given by the LONDON COLLEGE for the preparation of extracts: —

"In preparing all kinds of extracts, unless otherwise directed, evaporate the fluid as quickly as possible in a broad, shallow dish placed in a water bath, until the extract acquire a consistence proper for forming pills; and, towards the end of the operation, stir assiduously with a spatula.

"Sprinkle a small quantity of rectified spirit upon all the softer extracts, to prevent them from becoming mouldy."

The EDINBURGH COLLEGE gives its general directions for the preparation of the *extracts by water*, under the extract of gentian; and for the *extracts by water and alcohol*, under the extract of bark.

PULPARUM EXTRACTIO, Edin.

Extraction of Pulps.

"FRUITS which afford a pulp, if unripe, or if ripe and dry, are to be boiled in a small portion of water, till they become soft; then the pulp is to be pressed through a hair sieve, and afterwards boiled in an earthen vessel with a gentle heat, stirring frequently to prevent it from burning, until it acquire the consistence of honey.

"In like manner the pulp of CASSIA FISTULA is to be boiled out from the bruised pod, and then brought to a proper consistence by evaporating the water.

"The pulps of recent and ripe fruits are to be pressed through a sieve without being previously boiled."

SUCCI SPISSATI, Edin.

Inspissated Juices.

"BEAT the fresh substance, and press it strongly through a canvass bag, in order to obtain the juice; which being put into a wide, shallow vessel, and heated by means of boiling water saturated with sea-salt, is to be reduced to the consistence of honey. The mass, when cold, is to be put into glazed earthen vessels, and moistened with strong alcohol."

The juices of fresh vegetables obtained by expression contain, besides the sap of which they chiefly consist, mucilage, fecula extractive matter, and the other proper juices and active principles of the plants. When newly expressed, these matters are mixed together, and form a viscid, heterogeneous fluid, which gradually separates by rest into two parts: the one formed of a deposit of all the insoluble components of the juice generally involved in mucilaginous matter; the other a clear liquor, consisting of water, holding some mucilage in solution, with the acids and salts, if any, and other soluble principles of the juice. As the clear liquor is that which is wished to be obtained for medical use, it is separated by first decanting it from the deposit, then filtering it repeatedly through a linen cloth, and adding about one-fortieth part of its weight of alcohol; after which it is allowed to remain at rest for some time, and again filtered previous to being put into the bottles in which it is intended to be preserved. The bottles should be kept in a cool cellar, and sunk up to the neck in sand.

By whatever means they are prepared, vegetable juices undergo chemical changes, and spontaneous decompositions from keeping, which necessarily affect their virtues as medicines.

The articles given in the Edinburgh Pharmacopœia, under the title *Succi spissati*, being associated by the London College with the extracts, and the difference between these preparations being scarcely sufficient to constitute a generic distinction, we have thought it proper not to alter the London arrangement in this respect, and have therefore placed the whole under the title, *Extracts.*

EXTRACTA SIMPLICIORA, Dub. *Simple Extracts.*

"All simple extracts, unless otherwise ordered, are to be prepared according to the following rule: —

"The vegetable matter is to be boiled in eight times its weight of water, which is to be reduced by boiling to one half; the liquor is then to be expressed, and after the fæces have subsided, to be filtered and evaporated by the heat of boiling water, until it begin to thicken; and is to be, finally, inspissated by a medium heat, from the steam of boiling water; frequently stirring, until it acquire a consistence proper for forming pills."

EXTRACTUM ARTEMISIÆ ABSYNTHII, Dub. *Extract of Wormwood.*

Syn. Extrait d'Absynthe (*F.*), Wermuth-extrakt (*G.*), Estratto d'Assenso (*I.*).

This is ordered to be prepared according to the above directions. It is nearly a simple bitter, the volatile oil being dissipated during the evaporation. It may be used in cases for which bitters are commonly prescribed, but it is scarcely ever used. The dose is from gr. x. to ℈ j. three times a day.

EXTRACTUM ACONITI, Lond. Dub. *Extract of Aconite* or *Wolfsbane.*

"Take of the fresh leaves of aconite, *a pound.* Bruise them in a stone mortar, sprinkling over them a little water; then express the juice, and without any depuration, evaporate it to a proper consistence."

SUCCUS SPISSATUS ACONITI NAPELLI, Edin. *Inspissated Juice of Aconite.*

"Let the fresh leaves of aconite be bruised; enclose them in a hempen bag, and press them strongly, until they yield their juice; which is to be evaporated in flat vessels, heated with boiling water saturated with chloride of sodium (*common salt*), and immediately reduced to the consistence of thick honey.

"After the mass is cold, let it be put into glazed earthen vessels, and moistened with alcohol."

Syn. Extrait d'Aconit (*F.*), Eisenhütlein-extrakt (*G.*), Estratto d'Aconito Napello (*I.*)

Mr. Brande informs us, that 1 cwt. of fresh aconite yields about 5 lbs. of extract.[1] The activity of the plant is very uncertain, and depends on soil and the nature of the seasons. Its active principle is an alkaloid, which has been named *aconitina.*

This extract, or inspissated juice, is the form under which Stoerk introduced wolfsbane into practice. It has an obscure, brownish-red colour, a disagreeable odour, and an acrid, slightly styptic taste. Its medicinal properties are the same as those of the plant, but it is very seldom used. (See Part ii.) The dose at first should be gr. $\frac{1}{4}$ only, gradually increased to grs. iv. taken night and morning.

EXTRACTUM ALOES PURIFICATUM, Lond. EXTRACTUM ALOES HEPATICÆ, Dub. *Purified Extract of Aloes.*

"Take of aloes, in powder, *fifteen ounces;* boiling water, *a gallon.* Macerate for three days with a gentle heat, then strain, and set aside the solution, that the dregs may subside. Pour off the clear liquor, and evaporate it to a proper consistence."

Syn. Extrait d'Alöes (*F.*), Alöe-extrakt (*G.*), Estratto d'Aloe (*I.*).

This extract consists chiefly of the extractive matter of the aloes; but during the inspissation it is partially oxidized and rendered less soluble; consequently, the extract is not completely soluble in water. It is employed in the same cases as the aloes, and is said to be less stimulant and griping. The dose is from grs. iij. to grs. xv. given in the form of pills.

EXTRACTUM ANTHEMIDIS NOBILIS[2], Edin.

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[1] *Manual of Pharmacy,* p. 386.
[2] Extractum chamæmeli, P. L. 1787.

EXTRACTUM FLORUM CHAMÆMELI, Dub. *Extract of Chamomile Flowers.*

Syn. Extrait de Camomille Romaine (*F.*), Kamillen-extrakt (*G.*), Estratto di Fiori di Camomillo (*I.*).

The Edinburgh extract is to be prepared in the same manner as the extract of gentian of that College; the Dublin, after the manner directed for the preparation of the simple extracts.

In these processes the volatile oil is dissipated, and a simple bitter extract remains, possessing scarcely any of the properties of the plant; 1 cwt. of the flowers yields 48 lbs. of extract. It is of a deep brown colour, and has a grateful bitter taste, but scarcely any odour. It has scarcely any efficacy when used alone; but is an useful adjunct to rhubarb and sulphate of zinc, in stomachic pills. The dose may be from grs. x. to ℈j. given twice or thrice a day.

EXTRACTUM BELLADONNÆ, Lond. SUCCUS SPISSATUS ATROPÆ BELLADONNÆ, Edin. Dub. *Extract of Belladonna.*

"Take of fresh leaves of belladonna, *a pound*. Bruise them in a stone mortar, sprinkling a little water over them; then express the juice, and, without any separation of the sediment, evaporate it to a proper consistence."

Syn. Extrait de Belladonne (*F.*), Belladonna-extrakt (*G.*), Estratto de l'erba di Belladonna (*I.*).

The inspissated juice of the Edinburgh Pharmacopœia is to be prepared in the same manner as the inspissated juice of aconite.

This extract is inodorous, and has a bitterish taste. Its medicinal properties are the same as those of the plant, but weaker. They depend on an alkaloid, which has been named *Atropia*. We have witnessed benefit from extract of belladonna in hooping-cough, in combination with carbonate of soda; but it requires to be exhibited with great caution. A plaster, composed of equal parts of the extract and carbonate of ammonia, or of soap plaster, is efficacious in relieving local pains. An ointment, also made with equal proportions of the extract and simple ointment, is useful in allaying the pain of chordee; and the extract rubbed on the affected part has been found a useful means of procuring temporary relief from the pain of neuralgia. A little of it rubbed upon the eyelid dilates the pupil; thence it has been found useful in the operation for cataract. The dose for an adult is from gr. j. gradually increased to gr. v. given in the form of pills. In cases of hooping-cough in children, the dose is $\frac{1}{10}$ of a grain, gradually augmented until a scarlet eruption appear on the skin, or the sight become affected. This extract, when taken in very large doses, produces all the symptoms of a powerful narcotic poison. The most striking are dilatation and immobility of the pupils, confused vision or insensibility to the impression of external objects; the vessels of the conjunctiva appearing as if injected with blue blood; dryness of the lips, the tongue, the palate, and fauces. Sometimes there is difficult deglutition, nausea, syncope, frequent flexion of the body forward, continual movements of the hands and fingers, lively delirium, with an idiotic smile, difficulty of articulation, and a kind of tenesmus. If these effects subside, the healthy functions are restored, but every recollection of the previous state is lost. Sometimes, the patient passes into a state of fatuity, livid spots appear on different parts of the body, the pulse sinks, the intestines become paralyzed, profuse colliquative sweats break forth, and death supervenes.

Dissections display signs of inflammation of the mucous coat of the digestive canal, sometimes proceeding to ulceration; the liver and lungs are more or less inflamed, and the latter gorged with black blood. The body rapidly passes into putrefaction.

The remedies in poisoning by belladonna or its extract, are, after removing the poison by the stomach syringe, affusions of cold water on the head and body, acidulated drinks, and vomiting and purging.

EXTRACTUM CINCHONÆ LANCIFOLIÆ, Lond.[1]
Extract of lance-leaved Cinchona.

"Take of lance-leaved cinchona bark, bruised, *fifteen ounces;* water, *four gallons.* Boil down from a gallon of the water to six pints, and strain the liquor while it is warm. In the same manner boil it down again four successive times, in an equal quantity of water, and strain. Finally, mix the solutions together, and evaporate the mixture to a proper consistence."

EXTRACTUM CINCHONÆ CORDIFOLIÆ, Lond.

EXTRACTUM CINCHONÆ OBLONGIFOLIÆ, Lond. These are to be prepared in the same manner as the EXTRACT OF LANCE-LEAVED CINCHONA.

Dublin.

"Take of cinchona bark, in coarse powder, *a pound;* water, *six pounds.* Boil for a quarter of an hour in a vessel nearly covered; then filter the decoction while it is yet hot, and set it aside. Boil the residue again in the same quantity of water, and filter it in the same manner: repeat this a third time; and, finally, mix all the liquors, and evaporate the mixture to a proper consistence.

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[1] Extractum corticis Peruvianæ, P. L. 1754.

"This extract should be kept in two states: one *soft*, fit for making pills; and the other *hard*, or in a state proper to be reduced to powder."

Syn. Extrait de Quinquina (*F*)., Wäss rigtes China-extrakt (*G.*), Estratto di China aquosa (*I.*).

The operation of the same causes as those which we stated to be unfavourable to decoction, as a form of preparation for the exhibition of cinchona, are still more hurtful to its efficacy in the form of extract; and, according to Sir John Pringle, the extract is less efficacious, even in equal quantities, than the simple powder. These extracts, however, certainly contain kinates of cinchonia and quina; and they sit lightly on the stomach when the powder is rejected. They are usually ordered in doses of from grs. x. to ʒ ss. dissolved in any distilled water; but it is necessary to observe, that, owing to the oxidizement of the extractive matter, the solubility of the extracts is diminished during their formation; scarcely more than one half of them is soluble in water. They have a very bitter taste, but it is less austere than the bark.

EXTRACTUM CINCHONÆ LANCIFOLIÆ, Edin. *Resinous Extract of lance-leaved Bark.*

"Take of lance-leaved cinchona bark, in powder, *one pound*; alcohol, *four pounds*. Digest for four days, and pour off the tincture. Boil the residue in five pounds of distilled water for fifteen minutes, and strain the decoction, while it is hot, through a linen cloth. Repeat this coction with an equal quantity of distilled water, strain again, and evaporate the liquor to the consistence of thin honey. Distil the alcohol from the tincture until it be reduced to a similar consistence. Then mix the inspissated liquors, and evaporate them to a proper consistence in a bath of boiling water, saturated with chloride of sodium."

EXTRACTUM COLCHICI ACETICUM, Lond. *Acetic Extract of Colchicum.*

"Take of fresh colchicum (cormus), *a pound*; acetic acid, *three fluid ounces*. Bruise the cormus, gradually sprinkle on the acetic acid, then express the juice, and evaporate it in an earthenware vessel, not glazed with lead, to a proper consistence."

EXTRACTUM COLCHICI CORMI, Lond. *Extract of the bulbs of Colchicum.*

This extract is to be prepared in the same manner as that of Aconite.

These extracts may be used in the same cases as the other preparations of colchicum, namely, gout and rheumatism: but I have found the wine of the seeds more serviceable than any. The dose is from gr. j. to grs. iv. every third or fourth hour.

EXTRACTUM COLOCYNTHIDIS, Lond. Dub. *Extract of Colocynth.*

"Take of colocynth, sliced, *a pound;* water, *two gallons.* Mix, and boil with a slow fire for six hours, frequently adding distilled water, that it may always be the same measure. Strain the liquor while it is hot. Lastly, evaporate it to a proper consistence."

Syn. Koloquinthen-extrakt (*G.*).

This extract is a milder but less powerful cathartic than the pulp from which it is prepared, and with the addition of calomel, forms an excellent purgative pill, which operates without griping. It has however the disadvantage of becoming extremely tough when kept. From grs. v. to ʒ ss. is the usual dose.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM[1], Lond. *Compound Extract of Colocynth.*

"Take of colocynth pulp, sliced, *six ounces;* purified extract of aloes, *twelve ounces;* scammony, powdered, *four ounces;* cardamom seeds, powdered, *one ounce;* hard soap, *three ounces;* proof spirit, *one gallon.* Macerate the colocynth in the spirit, with a gentle heat, for four days. Strain the spirit, and add to it the aloes, the scammony, and the soap; then evaporate it to a proper consistence, and towards the end mix in the cardamom seeds."

Dublin.

"Take of the pulp of colocynth, cut small, *six ounces;* hepatic aloes, *eleven ounces;* scammony, *four ounces;* lesser cardamom seeds, husked, *an ounce;* hard soap, *three ounces;* proof spirit, *a gallon.* Digest the colocynth in the water in a covered vessel, with a medium of heat, for four days; express and strain the liquor, and add to it the aloes and scammony, first separately reduced to powder; then evaporate the mixture with a medium heat to a proper consistence for making pills, and towards the end of the inspissation add the gelatinized soap and the powdered seeds, and with frequent stirring mix the whole intimately together."

By this combination of powerful cathartic substances a purgative mass is obtained more manageable and less irritating than any of its components separately taken. It forms a very useful pill for relieving the habitual costiveness of leucophlegmatic habits; and in obstinate visceral obstructions, when combined with calomel, which is not decomposed, as might *à priori* be supposed. The dose is from gr. v. to ʒ ss., repeated every eight hours until it operate.[2]

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[1] Extractum catharticum, P. L. 1745.

[2] BARCLAY'S ANTIBILIOUS PILLS are composed of *ext. of colocynth* ʒ ij., *ext. of jalap* ʒ j., *almond soap* ʒ iss., *guaiac* ʒ iij., *tartarized antimony* gr. viij., *oils of juniper,* of *carraway,* and of *rosemary,* of each, four drops; *syrup of buckthorn,* sufficient to form a mass, which is to be divided into sixty-four pills.

EXTRACTUM CONII, Lond. SUCCUS SPISSATUS CONII MACULATI, Edin. *Extract of Hemlock.*

The London extract is ordered to be prepared in the same manner as the extract of aconite.

The Edinburgh preparation is to be made according to the directions ordered for the preparation of inspissated juices.

SUCCUS SPISSATUS CONII, Dub. *Inspissated Juice of Hemlock.*

"Express hemlock leaves, gathered when the flowers are about to appear, and allow the juice to remain six hours to deposit the fæces; then evaporate the pure juice to a proper consistence with a moderate heat."

Syn. Extrait de Cigue (*F.*), Schierlings-extrakt (*G.*), Estratto del' erba della Cicuta (*I.*).

This extract, or inspissated juice, should be of a clear olive colour, have a fœtid odour, and a bitterish, saline taste, and disengage a powerful odour of conia, when rubbed with pure potassa. One cwt. of hemlock leaves yields from three to five lbs. of extract.[1] Although it be the form in which Stoerk introduced hemlock into practice, yet the narcotic power of the remedy is always impaired by this mode of preparation; and it is still more weakened by keeping, being nearly lost when a saline efflorescence begins to appear on the surface of the extract. It varies in its power according to the soil where the plant grows, and the seasons. It is used in the same cases as the powder, with which it is frequently mixed when it is to be made into pills; and is an useful adjunct to mercurials in cutaneous affections. I have given it in the manner of Stoerk, and to the same extent, in carcinomatous affections, with most decided advantage. Dr. John Davey employed it in combination with tartar emetic in pneumonia, accompanied with so much debility as to forbid the use of the lancet. Bergius recommends it in impotency.[2] The dose is gr. iij. gradually increased to ℈j ss., given twice or thrice a day.[3]

The extract, when good, should contain conia: and it is useless if it do not evolve the odour of it, when tested with potassa.

EXTRACTUM DIGITALIS, Lond. *Extract of Foxglove.*

It is prepared in the same manner as the extract of aconite

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1 *Brande's Manual,* p. 394.

2 "Impotentiam virilem sub usu conii curatam observavi, in viro quodam plusquam quadragenario, qui omnem erectionem penis perdiderat, postinde tamen plures liberos procreavit." — *Bergius Nat. Med.* i. 195.

3 John Hunter proved its poisonous property by giving ℥i. of it for a dose. The patient discontinued the remedy for a few days, and then recommenced it, with half the dose; but it proved fatal.

This extract appears to be unnecessary; and it is a more uncertain form of the medicine than the powder. The dose is from gr. ss. to grs. ij. or more.

EXTRACTUM ELATERII, Lond. *Extract of Elaterium.*

"Slice the ripe pepos of elaterium, express the juice very gently, and pass it through a very fine hair-sieve; then set it aside for some hours until the thicker part has subsided. Reject the thinner supernatant part, and dry the thicker with a gentle heat."

Syn. Elaterium (*F.*), Estratto del frutto della Momordica (*I.*).

ELATERII EXTRACTUM, Dub. *Elaterium.*

"Slice ripe wild cucumbers, and strain the juice, very lightly expressed, through a fine hair-sieve, into a glass vessel; then set it aside for some hours until the thicker part subside: reject the supernatant liquor, and dry the fecula, laid upon a linen cloth and covered with another, by a medium heat."

The substance obtained by these processes is neither an extract nor an inspissated juice, but a peculiar modification of fecula, combined with the active principle of the fruit; it is therefore surprising, that both the Dublin and the London Colleges term it *extractum elaterii.* Elaterium is contained in the juice which surrounds the seeds only; and it subsides from this juice, obtained without pressure. From Dr. Clutterbuck's experiments[1], the quantity of elaterium in the fruit appears to be so small, that he obtained six grains of it only from forty of the cucumbers. It is often adulterated with starch, on which account we scarcely ever obtain two samples of it of the same strength. When good, elaterium is of a pale-greenish colour, has a bitter taste, is light and pulverulent. It is very remarkable that the Edinburgh College has ejected so important a remedy from the last edition of its Pharmacopœia.

Medical properties and uses.—Elaterium is a very powerful hydragogue, and excites sickness, severe vomiting, and hypercatharsis, if it be not cautiously administered. On this account it is seldom used as a cathartic; but in ascites it causes the entire evacuation of the fluid, when gamboge, and bitartrate of potassa, foxglove, and every other remedy have failed. The best mode of administering it is to give it in divided doses of gr. $\frac{1}{8}$ each, combined with one grain or more of calomel, every fourth hour, until it begin to operate, and then extend the intervals.

EXTRACTUM GENTIANÆ, Lond. EXTRACTUM RADICIS GENTIANÆ LUTEÆ, Dub. *Extract of Gentian.*

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[1] *London Med. Repos.* vol. xii.

"Take of gentian sliced, *two pounds and a half;* boiling distilled water, *two gallons.* Macerate for twenty-four hours; then boil down to *four pints.* Strain the liquor while it is hot, and evaporate it to a proper consistence."

EXTRACTUM GENTIANÆ LUTEÆ, Edin. *Extract of Gentian.*

"Take of gentian root, *any quantity.* Having sliced and bruised it, pour upon it eight times its weight of boiling water. Boil down to one half, express the liquor strongly, and strain it. Evaporate the decoction immediately to the consistence of thick honey, in a bath of boiling water saturated with muriate of soda."

Syn. Extrait de Gentiane (*F.*), Enzian-extrakt (*G.*), Estratto di Gentiana (*I.*).

The bitter principle of gentian root is not injured by this form of preparation. The extract is inodorous, very bitter, black, shining, and tenacious. It is tonic; but it is chiefly used as a vehicle for the exhibition of the metallic oxides. The dose is from grs. x. to ʒss, given twice or thrice a day.

EXTRACTUM GLYCYRRHIZÆ, Lond. Dub. *Extract of Liquorice.*

"Take of liquorice root, sliced, *two pounds and a half;* boiling distilled water, *two gallons.* Macerate for twenty-four hours; then boil down to *four pints.* Strain the hot solution, and evaporate it to a proper consistence."

There is scarcely any of this extract prepared by the apothecary, the greater part of it being imported from Spain and Sicily, where it is prepared in the following manner: — The roots, when three years old, are dug up, washed, then crushed in an olive mill, which presses out the juice, in the same way as oil from olives. The roots are then boiled for four or five hours, again pressed in the olive press, and the whole juice is, lastly, slowly boiled in an iron vessel to a proper consistence, and moulded into rolls. The pure extract of liquorice, sold in the shops under the name of *refined liquorice;* is prepared from the impure extract of commerce, by dissolving it in water, straining and inspissating it in the usual manner. It is an useful demulcent for allaying tickling cough, as from its tenacity it hangs about and sheathes the fauces.

Officinal preparations. — *Pilulæ opiatæ*, E. *Pilulæ Scilliticæ*, E. *Trochisci Glycyrrhizæ glabræ*, E. *Trochisci Glycyrrhizæ cum Opio*, E.

EXTRACTUM HÆMATOXYLI[1], Lond. EXTRACTUM HÆMATOXYLI CAMPECHIANI, Edin. EXTRACTUM SCOBIS HÆMATOXYLI, Dub. *Extract of Logwood.*

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[1] Extractum Ligni Campachensis, P. L. 1745.

This extract is prepared in the same manner as the two former extracts.

Syn. Campecheholz-extrakt (*G.*).

One cwt. of the wood yields 20 lbs. of the extract.[1] This extract is almost inodorous, has a sweet austere taste, and a deep ruby colour. It becomes extremely brittle when kept.

It is regarded as useful in the protracted stage of diarrhœa and dysentery. The dose is from grs. x. to ʒss., dissolved in cinnamon water or peppermint water. It is incompatible with alkalies.

EXTRACTUM RADICIS HELLEBORI NIGRI, Edin. *Extract of Black Hellebore Root.*

Syn. Extrait d'Ellebore (*F.*), Schwarz Niesenwurz-extrakt (*G.*).

This is to be prepared from the bruised root, after the manner directed for the extract of gentian by the Edinburgh College, and the extract of wormwood by the Dublin College. The effects of this extract are those of a drastic purgative, and the emmenagogue power which has been attributed to it seems to depend on its action as a purgative. It has been advantageously given in chronic diseases of the skin.

EXTRACTUM HYOSCYAMI, Lond. SUCCUS SPISSATUS HYOSCYAMI NIGRI, Edin. SUCCUS SPISSATUS HYOSCYAMI, Dub. *Extract of Henbane.*

Syn. Extrait de Jusquiame (*F.*), Hyoszyamus extrakt (*G.*), Estratto di Giusquiama nera (*I.*)

Prepared in the same manner as the extract of aconite.

This extract has a disagreeable, slightly fœtid odour, and a nauseous, bitterish, subsaline taste. It is possessed of considerable narcotic powers, and is used as a substitute for opium in nervous affections, mania, gout, rheumatism, and all painful complaints, in which it is wished to avoid the costiveness which opium is apt to induce. In combination with colocynth, it augments the purgative and diminishes the griping properties of that drug. A solution of it in water, in the proportion of one drachm to the ounce, dropped into the eye, very much dilates the pupil; and has been used, on the recommendation of Professor Himly, for facilitating the operation for cataract; and also in contracted pupils not accompanied by adhesion of the iris to the capsule.[2] The dose is from grs. ij. to ℈ss., given in the form of pills.

EXTRACTUM JALAPÆ[3], Lond. *Extract of Jalap.*

"Take of jalap root, powdered, *two pounds;* rectified spirit, *a gallon and a half;* distilled water, *two gallons.* Macerate the jalap root in the spirit for four days, and decant the tincture. Boil the residue in the water down to half a gallon.

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[1] *Brande's Manual*, p. 397.

[2] *Edin. Medical and Surg. Journal*, vol. ix. pp. 6. 11.

[3] Extractum Jalapii, P. L. 1745.

Then strain separately the tincture and the decoction; distil the former, and evaporate the latter, until both begin to thicken. Lastly, mix the extract with the resin, and evaporate the mixture to a proper consistence.

"This extract should be kept in a *soft* state, fit for forming pills, and in a *hard* state, so that it may be reduced to powder."

EXTRACTUM CONVOLVULÆ JALAPÆ, Edin. *Extract of Jalap.*

This is ordered to be prepared from the root, in the same manner as the extract of cinchona bark. (*Edin.*)

EXTRACTUM JALAPÆ, Dub. *Extract of Jalap.*

"Take of jalap root, bruised, *a pound;* rectified spirit, *four pints;* water, *a gallon.* Macerate the jalap root in the spirit four days, and pour off the spirit. Boil what remains in the water to two pounds. Then strain the tincture and the decoction separately: evaporate the latter, and distil the former, until each are inspissated. Finally, mix the extract with the resin, and continue the evaporation, by means of steam, until the whole is of a proper thickness."

Syn. Extrait de Jalap (*F.*).

One cwt. of jalap yields about 50 lbs. of watery extract, and fifteen of resinous extract.[1] These extracts contain all the active principles of the jalap root. They are, however, apt to gripe during their operation: thence, particularly when given to children, they should be triturated with sugar and almonds, or mucilage, so as to form an emulsion, in which state they operate freely, and without griping. The dose, to an adult, is from grs. x. to ℈j.

EXTRACTUM LACTUCÆ, Lond. *Extract of Lettuce.*

It is prepared in the same manner as extract of aconite.

SUCCUS SPISSATUS LACTUCÆ SATIVÆ, Edin. *Inspissated Juice of Garden Lettuce.*

Syn. Extrait de Laitue (*F.*).

This is to be prepared from the fresh leaves, according to the general directions for preparing inspissated juices.

SUCCUS SPISSATUS LACTUCÆ VIROSÆ, Edin. *Inspissated Juice of the Wild Lettuce.*

Syn. Extrait de Laitue vireuse (*F.*), Estratto dell' erba della Lactuca (*I.*).

To be prepared from the fresh herb, in the same manner as the other inspissated juices.

One cwt. of lettuce yields between four and five lbs. of the extract.[2]

The extracts of both the above species of lactuca are exhibited as substitutes for opium, in cases in which the intention is rather to allay irritation than to produce the full effect of a

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[1] *Brande's Manual,* p. 400. [2] Ibid.

narcotic. The dose is from grs. iij. to grs. vj., and more, gradually increased.[1]

EXTRACTUM LUPULI, Lond. Dub. *Extract of Hops.*

It is to be prepared in the same manner as the extract of gentian.

One cwt. of the strobiles yields about 40 lbs. of the extract.[2] This extract is inodorous; and has the bitter taste peculiar to the hop. Its virtues depend on lupulin. We have found it an useful but very weak anodyne in gout, acute rheumatism, and cases which do not admit of the use of opium. The dose is from grs. v. to ℈j., given in the form of pills, or dissolved in any aqueous vehicle.

EXTRACTUM OPII PURIFICATUM[3], Lond. *Purified Extract of Opium.*

"Take of opium, sliced, *twenty ounces;* water, *one gallon.* Pour a small portion of the water upon the opium, and macerate for twelve hours, that it may become soft; then, adding gradually the remaining water, rub them together till they be well mixed, and set the mixture apart, that the feculencies may subside. Lastly, strain the liquor, and evaporate it to a proper consistence."

EXTRACTUM OPII AQUOSUM, Dub. *Watery Extract of Opium.*

"Take of opium, *two ounces;* boiling water, *a pint.* Rub the opium in the water for ten minutes, and, after a little, pour off the solution: rub the residuary opium in an equal quantity of boiling water for the same space of time, pouring off also this solution; and repeat the operation a third time. Mix together the decanted solutions, and expose the mixture in a broad open vessel to the air for two days. Lastly, strain it through linen, and by slow evaporation form it into an extract."

Syn. Extrait d'Opium (*F.*), Opiums-extrakt (*G.*), Estratto d'Oppio (*I.*).

Water takes up a certain proportion of all the constituents of crude opium, but less of the resinous than of the gummy part; and the watery solution contains more of the meconate of morphia, on which depends the remedial quality of opium.[4]

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1 The proper juice, collected by incisions into the flowering stem when the plant is in flower, is preferable to this extract. A good plant of garden lettuce will yield ʒss. of dried juice: one of L. *virosa,* will yield ʒj.

2 *Brande's Manual,* p. 398.

3 Extractum Opii, P. L., 1824.

4 This extract, however, contains some *narcotina;* and this is supposed to produce that excitement, which even the aqueous extract occasions previous to its sedative effect. M. Robiquet (*Journ. de Pharm.* May, 1821,) proposes to free it of this principle, by agitating the extract as soon as it acquires the consistence of syrup with æther; and repeating this agitation with fresh portions of æther, as long as the æther, on distillation, deposits any crystals of *narcotine.* The extract, thus prepared, contains only morphia, gum, and extractive.

In the Dublin preparation, the quantity of active matter must necessarily be greater than in the London, owing to the employment of boiling water for the second and third triturations. This extract, therefore, differs very little from opium; but, as the inspissation cannot always be conducted exactly in the same manner, its strength must consequently vary.

Qualities. — This extract is inodorous, has a bitter taste, and is of a very deep brown colour. It is not altogether soluble in water; but is not precipitated from its solution by alcohol. It however affords precipitates, with the following substances, which ought not therefore to enter into prescriptions with its solution; viz. solutions of astringent vegetables, the alkaline carbonates, bichloride of mercury, sulphate of copper, sulphate of zinc, acetate and diacetate of lead, and nitrate of silver.

Medical properties and uses. — This extract produces the effects of opium, but with less subsequent derangement of the nervous system. It is therefore supposed to be well adapted for the diseases of children, and very irritable habits. The dose is from gr. j. to grs. vj., for an adult.

Officinal preparation. — *Syrupus Opii*, D.

EXTRACTUM PAREIRÆ, Lond. *Extract of Pareira.*

It is prepared in the same manner as the extract of gentian. This extract possesses the diuretic properties of the plant, and has been found useful in catarrhus vesicæ, and other diseases of the urinary organs. It may be administered in combination with narcotics and demulcents, in doses of from grs. x. to ʒ ss.

EXTRACTUM PAPAVERIS, Lond. EXTRACTUM PAPAVERIS SOMNIFERI. Edin. *Extract of Poppies.*

"Take of the capsules of the poppy, freed from the seeds, and bruised, *fifteen ounces;* boiling water, *a gallon.* Macerate for twenty-four hours; then boil down to four pints; strain the hot liquor, and evaporate it to a proper consistence."

Syn. Extrait de Pavot (*F.*).

This extract possesses nearly the same medicinal properties as opium, but in a much weaker degree; and is less apt to occasion the nausea, headach, and delirium, which opium not unfrequently produces. It is, therefore, to be preferred for procuring sleep in diseases in which the head is much affected. The dose is from grs. ij. to ℈ j., given in the form of pills.

EXTRACTUM CORTICIS QUERCUS, Dub. *Extract of Oak Bark.*

Syn. Estratto della Quercia (*I.*).

This extract consists principally of tannin, which is therefore not liable to be much injured by this form of preparation, although it is partly converted into extractive; but it possesses no peculiar advantages to recommend it.

EXTRACTUM RHEI, Lond. Dub. *Extract of Rhubarb.*

"Take of rhubarb root, in powder, *fifteen ounces;* proof spirit, *a pint;* water, *seven pints.* Macerate for four days in a gentle heat, then strain the solution, and set it apart, that the feculencies may subside. Pour off the clear liquor, and evaporate it to a proper consistence."

Syn. Extrait de Rhubarbe (*F.*), Rhabarber-extrakt (*G.*).

Although the purgative properties of the rhubarb be obtained to a certain degree in this extract, yet its virtues are certainly impaired during the inspissation; and the simple infusion is in every respect a preferable form of preparation. An extract, however, of great power, may be prepared by forming Turkey rhubarb into a pulp, then pressing and evaporating the solution quickly in dry air. It is of a deep golden hue, with all the odour of the rhubarb. The dose is from grs. x. to ʒ ss. given in the form of pills.

EXTRACTUM RUTÆ GRAVEOLENTIS, Edin. EXTRACTUM FOLIORUM RUTÆ, Dub. *Extract of Rue.*

The Edinburgh extract is to be prepared in the same manner as the extract of gentian; the Dublin, after the manner of the simple extracts. Prepared by either process, this extract is inodorous, and has a bitter, acrid taste. Its medicinal properties are different from those of the plant; the stimulant and narcotic powers of which depend on the volatile oil it contains, which is dissipated during the inspissation of the extract. The dose is from grs. x. to ℈j. in pills.

EXTRACTUM SPARTII SCOPARII, Dub. *Extract of Broom Tops.*

This extract is to be prepared in the same manner as the extract of aconite. It is said to be diuretic, but its efficacy is doubtful; and it is scarcely ever employed. The dose is from ʒss. to ʒj., or more.

SUCCUS SPISSATUS SAMBUCI NIGRI, Edin. *The Inspissated Juice of the Black Elder.*

"Take of the ripe berries of the black elder, *five parts;* purified sugar, *one part.* Boil, with a gentle heat, to the consistence of thick honey."

Syn. Eingedicker Fliedersaft (*G.*).

We are perfectly unacquainted with the use to which this extract can be put as a remedial agent.

EXTRACTUM SARZÆ, Lond. EXTRACTUM SARSAPARILLA, Dub. *Extract of Sarsaparilla.*

"Take of sarsaparilla root, sliced, *two pounds and a half*; boiling distilled water, *two gallons*. Macerate for twenty-four hours, then boil down to a gallon: strain the solution while it is hot, and evaporate it to a proper consistence."

The experiments of the late Mr. Pope, Mr. Battley, and M. Robinet, have demonstrated, that the red, or, as it is termed, Jamaica sarsaparilla yields a much larger quantity of extract than any of the other species of sarsaparilla. It also appears from Mr. Pope's experiments, "that by submitting the root, cut transversely to the action of steam or of distilled water, at a temperature somewhat below boiling, an elegant, soluble extract may be obtained, containing all the virtues of the plant, not liable to decomposition, and applicable to the various purposes of extemporaneous prescription[1];" whilst, by the method ordered in the above formula of the London College, an insoluble, inefficacious extract only is obtained.

When properly prepared, without heat, this extract possesses all the medicinal virtues of the root; but prepared according to the above formula it has little to recommend it to practice. The dose is from grs. x. to ʒj., dissolved in the decoction, or given in the form of pills.

EXTRACTUM SARSAPARILLÆ FLUIDUM, Dub. *Fluid Extract of Sarsaparilla.*

"Take of root of sarsaparilla, sliced, *one pound*; water, *twelve pints*. Boil for an hour, and pour off the liquor. Then add twelve pints more of water, and repeat the boiling and effusion. Let the fluid be strongly expressed from the residuary matter. Set aside the mixed decoctions until the fæces subside; then evaporate the mixture, by continued ebullition, to thirty ounces, and add two ounces of rectified spirit."

This extract, as it is termed, possesses no advantages over the ordinary decoction, except for the facility of preparing extemporaneous prescriptions. It is less active than the common extract.

EXTRACTUM STRAMONII, Lond. Dub. *Extract of Thorn Apple.*

"Take of thorn apple seeds, *fifteen ounces*; boiling distilled water, *one gallon*. Macerate for four hours in a lightly covered vessel near the fire; then take out the seeds; bruise them in a stone mortar, and put them again into the liquor. Then boil to four pints, and strain the decoction whilst it is hot. Finally, evaporate it to a proper consistence."

The medicinal powers of this extract are less to be depended

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[1] *Medico-Chirurg. Trans.* vol. xii. p. 345.

on than those of a tincture prepared with ℥ ij. of the herb, and f ℥ xvj. of proof spirit. The dose of the extract is half a grain to two grains, in the form of pills.

EXTRACTUM NUCIS VOMICÆ, Dub. *Extract of Nux Vomica.*

"Take of rasped nux vomica, *eight ounces;* proof spirit, *two pints.* Digest for three days in a close vessel; strain the fluid, and express strongly the residuum: to this add a pint and a half of proof spirit; digest for three days, and express the residuum. The mixed liquors being consumed by distillation to one fourth, reduce to a proper thickness.

"The extracts while thickening should be frequently stirred. They may be reduced to a proper thickness in a medium heat by the aid of steam. The process ought to be conducted so as to prevent as much as possible the contact of the air: the softer extract may be sprinkled with rectified spirit."

The object of this process is to obtain the strychnia without decomposition. In our opinion, it is preferable to employ the strychnia itself; and it can be procured with very little more trouble, and not more expense. The strychnia may be dissolved in alcohol; and by this means the dose may be accurately determined; but it is still better to give it in the form of acetate by dissolving it in a given quantity of distilled vinegar.

Besides the strychnia, this extract contains a bitter principle, a resinous substance, a gummy matter, and a peculiar acid.

The dose of the extract is from half a grain to two grains.

EXTRACTUM TARAXACI, Lond. EXTRACTUM HERBÆ ET RADICIS TARAXACI, Dub. *Extract of Dandelion.*

"Take of fresh dandelion root, bruised, *fifteen ounces;* boiling distilled water, *a gallon.* Macerate for twenty-four hours; then boil down to four pints; strain the hot liquor, and evaporate it to a proper consistence.

Syn. Lowenzahn-extrakt (*G.*), Estratto di Tarassaco (*I.*).

The medicinal powers of dandelion have been already noticed. (See Part ii.) The extract should be made by pressing the proper juice from the recent roots taken up in autumn, and inspissating it rapidly in dry air. The extract is then of a brown-yellow colour, of an agreeable odour, and has a bitter acidulous taste. Dr. Pemberton affirms, that he has seen great advantage result from the use of this extract in doses of ʒss. in chronic inflammation and incipient scirrhus of the liver, and in chronic derangement of the stomach.[1] The usual dose is from grs. x. to ʒj. united with sulphate of potassa.

[1] *On Diseases of the Abdominal Viscera,* p. 43.

EXTRACTUM UVÆ URSI, Lond. *Extract of Bear's Whortleberry.*

It is prepared in the same manner as the extract of gentian.

This extract is a useful form of administering Uva Ursi in affections of the bladder and kidneys, with phosphatic deposits. It may be combined with narcotics. The dose is grs. vj. to ʒss.

INFUSA.

INFUSIONS.

THESE are solutions of vegetable matter, obtained by maceration either in cold or in boiling water. As in the case of decoction, the substance must be sliced or bruised if in a recent state, or pulverized if dry, in order to expose a large surface to the action of the menstruum. The term *infusion*, in pharmaceutical language, is confined to watery solutions.

The substances which water, without the aid of boiling, can extract from vegetable matter submitted to its action, are gum, mucus, extractive, tannin, the bitter and narcotic principles, gum-resin, volatile oil, acids, and alkalies; a range, which includes most of the principles on which the medicinal properties of plants depend. These principles, also, are less liable to be altered by infusion than by decoction; and, consequently, this form of preparation is to be preferred in every instance to which it is applicable. The strength and quality of the infusions are varied by the degree of temperature of the water: those made with hot water being necessarily stronger; but, particularly in the case of bitters, cold infusions are more grateful.

In making infusions, when heat is required, the vessel is to be placed near the fire, so that the temperature of the water may be kept up to the necessary point for a sufficient length of time to produce the effect intended. Perhaps it might be an advantage, were the external surface of infusion-pots covered with a metallic coating, and polished; by which, as the heat would be much more slowly radiated than from the vessels usually employed, the effect of it would be more uniform and certain in promoting the solvent powers of the water.

Infusions, like decoctions, are liable to undergo spontaneous decomposition, if kept even for a few days; and therefore the London College has properly directed a pint only to be made at one time: thus regarding them as extemporaneous preparations.

INFUSUM ANTHEMIDIS, Lond. INFUSUM ANTHEMIDIS NOBILIS, Edin. INFUSUM CHAMÆMELI, Dub. *Infusion of Chamomile.*

"Take of chamomile, *five drachms;* boiling distilled water, *a pint.* Macerate for ten minutes (twenty-four hours, *Edin.*) in a lightly-covered vessel, and strain."

This infusion is clear, of a pale yellow colour, and has the odour and taste of the flowers. It precipitates solution of isinglass, whitish; infusion of yellow cinchona bark, white; solution of sulphate of iron and of tincture of sesquichloride of iron, black; solution of nitrate of silver, white; of bichloride of mercury, pale brown; and of acetate and diacetate of lead, yellowish white. These substances, therefore, are incompatible in prescriptions with this infusion.

Medical properties and uses. — This infusion is a good stomachic and tonic; and may be given in dyspepsia and other complaints attended with debility of the stomach, in doses of from f ℥j. to f ℥ij. two or three times a day. When exhibited warm it excites nausea, and is occasionally employed to assist the operation of emetics.

INFUSUM ARMORACIÆ COMPOSITUM, Lond. Dub. *Compound Infusion of Horse-radish.*

"Take of horse-radish sliced, mustard bruised, of each *an ounce;* compound spirit of horse-radish, *one fluid ounce;* boiling distilled water, *a pint.* Macerate the root and seeds in the water for two hours in a lightly-covered vessel, and strain; then add the compound spirit of horse-radish."

This infusion, after it is strained, deposits by rest a whitish feculent matter, which should be separated. The supernatant clear part is of a sulphur-yellow colour, and holds, dissolved in every fluid ounce, rather more than grs. x. of solid matter. It has a very pungent odour, and a hot, biting taste; precipitates infusion of galls, yellowish; and infusion of yellow cinchona bark, white. The solutions of the pure alkalies do not affect it; but with their carbonates whitish precipitates are produced; bichloride of mercury and nitrate of silver also cause precipitates: thence all these substances, except the pure alkalies, are incompatible in formulæ with this infusion. It soon spoils in hot weather, and emits an offensive odour.

Medical properties and uses. — This is not an unusal form of giving horse-radish, the stimulant and diuretic properties of which are aided by that of the mustard. It is particularly serviceable in paralysis, and in dropsies occurring after intermittents. The dose is from f ℥j. to f ℥iij. given three or four times a day.

INFUSUM AURANTII COMPOSITUM, Lond. Dub. *Compound Infusion of Orange-peel.*

"Take of dried orange-peel, *half an ounce;* lemon-peel, *two drachms;* cloves bruised, *one drachm;* boiling distilled water, *a pint.* Macerate for fifteen minutes in a lightly covered vessel, and strain."

This infusion has the agreeable odour and taste of the ingredients from which it is made. It is clear, and has the hue of deep-coloured sherry wine. It precipitates sulphate of iron, black; and also produces precipitates with acetate and diacetate of lead, infusion of yellow cinchona bark, and lime-water.

Medical properties and uses. — It is an excellent and grateful stomachic. The dose may be from f ℥j. to f ℥ij. given twice or thrice a day.

INFUSUM CALUMBÆ, Lond. INFUSUM COLOMBÆ, Edin. INFUSUM COLOMBÆ, Dub. *Infusion of Calumba.*

"Take of calumba, sliced, *five drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

The active matter of calumba is not all extracted by water. The infusion is inodorous, and tastes bitter. It is clear, of a pale-brown colour, and affords precipitates with infusion of yellow cinchona bark, lime-water, and solution of bichloride of mercury, which, therefore, ought not to be ordered in conjunction with it. This infusion soon spoils.

Medical properties and uses. — Infusion of calumba is a good stomachic bitter in dyspeptic cases; for restraining the nausea and vomiting which occur in pregnancy, and the severe diarrhœa and vomiting which often attend dentition. The dose may be from f ℥ jss. to f ℥ iij.

INFUSUM CARYOPHYLLI, Lond. Dub. *Infusion of Cloves.*

"Take of bruised cloves, *three drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

This infusion contains all the active matter of the cloves; one fluid ounce holding nearly grs. vj. in solution. It is of a deep, clear, brown colour, has an aromatic odour, and a bitterish aromatic taste: it affords precipitates with infusion of yellow cinchona bark, the strong acids, lime-water, sulphate and other salts, of iron, sulphate of zinc, acetate and diacetate of lead, and nitrate of silver. It also decomposes tartarized antimony.

Medical properties and uses. — It is a warm, grateful stomachic; and may be advantageously used in dyspepsia, from the abuse of ardent spirits, accompanied with a sensation of coldness at the stomach; in chronic gout, and flatulent colic. The dose is from f ℥ jss. to f ℥ ij., three or four times a day.

INFUSUM CASCARILLÆ, Lond. Dub. *Infusion of Cascarilla.*

"Take of cascarilla bark, bruised, *an ounce and a half;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

This is a clear, pale, reddish-brown infusion, having the aromatic odour of the bark, and a bitterish, aromatic taste. It is incompatible with the following substances, which it precipitates: namely, lime-water, infusion of galls, infusion of yellow cinchona bark, solutions of nitrate of silver, acetate and diacetate of lead, sulphate of zinc, and salts of iron, which are slowly thrown down, of a pale olive colour.

Medical properties and uses. — It is a slight stimulant and tonic; and is advantageously given in some alvine fluxes, particularly such as occur after measles; and in the aphtha gangrenosa of infants. In combination with carbonate of soda, it is an excellent tonic in those affections of children which are dependant on a weak state of the digestive organs, and accompanied with acidity. The dose is from f ℥ jss. to f ℥ iij.

INFUSUM CATECHU COMPOSITUM, Lond. Dub. *Compound Infusion of Catechu.*

"Take of extract of catechu, *six drachms;* cinnamon, bruised, *a drachm;* boiling distilled water, *a pint.* Macerate for an hour in a lightly-covered vessel, and strain."

INFUSUM ACACIÆ CATECHU, Edin. *Infusion of Catechu.*

"Take of pulverized extract of catechu, *two drachms and a half;* cinnamon bark, bruised, *half a drachm;* boiling water, *seven ounces;* simple syrup, *one ounce.* Macerate the extract and bark with the water for two hours, in a covered vessel; then strain, and add the syrup."

Syn. Infusion de Cachou (*F.*), Katechu infusum (*G.*), Infusio di Cato (*I.*).

In these formulæ it is intended that the whole of the soluble matter in the catechu taken up by the boiling water should remain dissolved after the infusion cools; but a considerable portion is deposited. When the extract is triturated with water at 212°, as much of it is dissolved as the water can hold in solution, so that a preparation similar to this infusion may be immediately made by simply triturating the materials together. The syrup, ordered by the Edinburgh College, prevents the preparation from keeping longer than two or three days, although without the syrup it will keep good for months.

Qualities. — This infusion is inodorous, has a slightly bitter, austere taste; and leaves, even when it contains no syrup an agreeable sweetness in the mouth. The colour, when the pale catechu is used, is a light brown; but when the dark catechu is employed, a deep red-brown. The following substances which precipitate its tannin, or otherwise alter its properties, ought not to be ordered in formulæ with it: namely, solution of isinglass, infusion of yellow cinchona bark, the strong acids, salts of iron, and of zinc, bichloride of mercury, tartar emetic, and acetate and diacetate of lead. The alkalies deepen the colour, and destroy its astringency.

Medical properties and uses. — This infusion, which is a powerful, agreeable astringent, is the best form under which catechu can be prescribed: it is very useful in long-continued diarrhœas, proceeding from a weakened condition of the intestines. The dose is from f ℥j. to f ℥ iij., given after every liquid dejection, or every four hours.

INFUSUM CINCHONÆ, Lond. Dub. *Infusion of Cinchona Bark.*

Syn. Infusion de Quinquina (*F.*), Chinainfusum (*G.*), Infuso di China (*I.*).

"Take of lance-leaved cinchona[1], bruised, *an ounce;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain." — *Lond.*

"Triturate the bark with a little of the water, and add the remainder during the trituration. Macerate for twenty-four hours, with frequent agitation, and decant the pure liquor." — *Dub.*

This infusion contains a portion of cinchonia, the febrifuge principle of this bark. Its strength is considerably augmented when f ʒ j. of diluted sulphuric acid is added to the boiling water before it is poured on the powdered bark. An infusion made with this addition contains a greater quantity of cinchonia than the ordinary infusion, in the proportion of 7 to 6; and the salt being a sulphate, it is more active in its effects. This infusion is slightly turbid, has a pale, pinkish-yellow colour, evolves more of the aromatic odour of the bark than the decoction, and has an equal degree of bitterness and astringency. It ferments, spontaneously, in the course of a few days during summer. It affords precipitates with the alkaline carbonates, lime-water, the salts of iron, and of zinc, nitrate of silver, bichloride of mercury, arsenious acid, acetate and diacetate of lead, carbonate of potassa, and tartar emetic; the aqueous infusions and decoctions of chamomile flowers, calumba,

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[1] The other species of cinchona may be used in the same manner and proportions.

cascarilla, horse-radish, cloves, catechu, orange-peel, foxglove, senna, rhubarb, valerian, simaruba, and elm bark.

Any considerable portion of the tinctures also produces precipitates in this infusion. Some of these take place immediately, others not till after several hours have elapsed: the febrifuge virtue is perhaps not destroyed by them, but the mixtures are certainly rendered inelegant. Sulphuric acid destroys the bitterness of the infusion, but not its astringency; and adds considerably to its efficacy.

Medical properties and uses.—The cinchona in this form agrees better with most stomachs than when in powder; but its powers are necessarily diminished. It is chiefly serviceable in dyspepsia, and convalescences, particularly after the maturation of the pustules in ecthyma *vulgare.* The dose is from f ℥ j. to f ℥ ij., three or four times a day.

INFUSUM CINCHONÆ LANCIFOLIÆ, Edin. *Infusion of Cinchona.* INFUSUM CINCHONÆ SINE CALORE, Dub. *Cold Infusion of Cinchona.*

"Take of cinchona bark, bruised, *one ounce;* water, *one pound* (*twelve ounces by measure,* Dub.). Macerate for twenty-four hours, agitating frequently, and strain. (Triturate the bark with a little of the water, and whilst triturating add the remainder: then macerate for twenty-four hours, occasionally agitating, and decant the clear liquor. —Dub.)."

The directions of the Dublin College for making this infusion are preferable to those of the Edinburgh College. It is nearly clear, but deposits by rest a small quantity of a brick-red sediment. It is affected by the same substances, and its properties and use are the same as those of the former preparation, from which it differs chiefly in strength. The residuum may be used for some purposes, as its active principle is not nearly exhausted.

INFUSUM CUSPARIÆ, Lond. *Infusion of Cusparia.*

"Take of cusparia, bruised, *five drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

This infusion is slightly turbid; of a brownish colour; has a somewhat aromatic odour, and a bitter taste. The solution of sulphate of iron throws down a greenish-yellow precipitate; sulphate of zinc a yellowish one; sulphate of copper a pea green; nitrate of silver, bichloride of mercury, acetate and diacetate of lead, infusions of galls and of catechu also cause precipitates in it. Tartar emetic is slowly decomposed by it. These substances, therefore, cannot properly be ordered in formulæ with this infusion.

Medical properties and uses.—This infusion possesses the stimulant and tonic properties of the bark, and is an useful form of giving it in typhoid fevers, obstinate bilious diarrhœa, and in dysentery, after proper evacuations. The tincture of cinnamon covers its taste, and makes it sit lighter on the stomach. The dose is from f℥j. to f℥iij. given every three or four hours.

INFUSUM DIGITALIS, Lond. *Infusion of Foxglove.*

"Take of dried foxglove leaves, *a drachm;* spirit of cinnamon, *a fluid ounce;* boiling distilled water, *a pint.* Macerate the foxglove leaves for four hours in a lightly-covered vessel, and strain: then add the spirit."

INFUSUM DIGITALIS PURPUREÆ, Edin. Dub. *Infusion of Foxglove.*

"Take of dried foxglove leaves, *one drachm;* boiling water, *eight ounces;* spirit of cinnamon, *one ounce.* Macerate the leaves with the water for four hours in a lightly covered vessel; then, having added the spirit, strain."

Syn. Infusion de Digitale purpurine (*F.*), Fingerhut aufgus (*G.*), Infuso di Digitale porporina (*I.*).

The strength of this infusion is just one half of that in the last Pharmacopœia.

The faint odour and nauseous bitter taste of the foxglove are covered by the spirit of cinnamon. The solution of sulphate of iron slowly throws down in them a pale olive precipitate: acetate and diacetate of lead and infusion or decoction of yellow cinchona bark produce instantaneous and copious precipitates.

Medical properties and uses. — These infusions do not differ materially from that made by the formula of Withering, and are well calculated to obtain, speedily, the diuretic effects of the remedy. The dose is from f℥ss. to f℥j. given twice a day; or every eight hours, if the patient be strong, and the symptoms very urgent. For the necessary cautions to be observed in administering them, see the article *Digitalis*, Part ii.

INFUSUM DIOSMÆ, Lond. *Infusion of Buchu.*

"Take of buchu, *an ounce;* boiling distilled water, *a pint.* Macerate for four hours in a lightly-covered vessel, and strain."

INFUSUM BUCHU, Dub. *Infusion of Buchu.*

"Take of the leaves of the Diosma *crenata, half an ounce;* boiling water, *half a pint.* Digest for four hours, and strain through a linen rag."

This infusion is warm and aromatic, owing to the large quantity of volatile oil in the glands of the leaves.

Medical properties and uses. — It is a light tonic, stimulant and diuretic; and has been found useful in diarrhœa and the decline of dysentery. The dose is f℥jss. to f℥ij.

INFUSUM GENTIANÆ COMPOSITUM Lond., *Compound Infusion of Gentian.*

"Take of gentian, sliced, orange peel, dried, of each *two drachms;* fresh lemon-peel, *four drachms;* boiling distilled water, *a pint.* Macerate for an hour in a lightly-covered vessel, and strain."

Edinburgh.

"Take of gentian root, sliced, *half an ounce;* dried orange-peel, bruised, coriander seeds, bruised, of each *a drachm;* diluted alcohol, *four ounces;* water, *one pound.* First, pour on the alcohol, and after three hours, the water; then macerate without heat for twelve hours, and strain."

Dublin.

"Take of gentian root, bruised, *two drachms;* fresh lemon-peel, *half an ounce;* dried orange-peel, *a drachm and a half;* proof spirit, *four ounces by measure;* boiling water, *twelve ounces by measure.* First, pour on the spirit, and, three hours afterwards, the water; then macerate for the space of two days, and strain."

The spirit ordered by the Edinburgh and Dublin Colleges is intended to aid the solvent power of the water, and to preserve the infusion, which in summer soon becomes ropy and spoils; but as infusions can always easily be prepared, and boiling water takes up the greater part of the active matter of the ingredients, the spirituous addition, and the length of time ordered for the maceration, are certainly objectionable. The formula of the London College is free from both these objections, and produces a clear infusion, of a yellowish colour, with the agreeable odour of the orange-peel, and a pleasant bitter taste.

Medical properties and uses. — These are very commonly used, and are elegant tonic and stomachic infusions. They are given in dyspepsia and chlorosis, united with chalybeates, or with alkalies; in atonic gout and diarrhœa, with absorbents and aromatics; in jaundice, with rhubarb and saline purgatives; and in dropsies, with squills and neutral salts. From f ℥j. to ℥ ij. may be given for a dose, three or four times a day.

INFUSUM KRAMERIÆ, Lond. *Infusion of Krameria.*

"Take of rhatany, *an ounce;* boiling distilled water, *a pint.* Macerate for four hours in a lightly-covered vessel, and strain."

This is a powerful astringent, either topically employed as a tooth-stick; or generally in chronic diarrhœa. The dose is from f ℥ ss. to f ℥ ij.

INFUSUM LINI COMPOSITUM, Lond. Dub. *Compound Infusion of Linseed.*

"Take of linseed, bruised, *six drachms;* liquorice root, sliced, *two drachms;* boiling distilled water, *a pint.* Macerate for four hours near the fire, in a lightly-covered vessel, and strain."

INFUSUM LINI USITATISSIMI, Edin. *Infusion of Linseed.*

"Take of linseed, *an ounce;* liquorice root, bruised, *two drachms;* boiling water, *two pounds.* Digest for four hours in a lightly-covered vessel, and strain."

Syn. Infusion de Semence de Lin (*F.*), Leinsamen aufguss (*G.*), Infuso di Semi di Lino (*I.*).

This infusion is a solution of mucus nearly in its pure state; clear, colourless, inodorous, and nearly insipid. Alcohol precipitates the mucus in white flocculi; and precipitates are also produced by diacetate and acetate of lead, and tincture of the sesquichloride of iron; thence these substances are incompatible with this infusion.

Medical properties and uses. — Infusion of linseed is a cheap and very useful demulcent, in the various cases in which this class of remedies is indicated, and during the internal exhibition of bichloride of mercury. The dose is f ℥ ij. frequently repeated.

INFUSUM LUPULI, Lond. *Infusion of Hops.*

"Take of hops, *six drachms;* boiling distilled water, *a pint.* Macerate for four hours in a vessel lightly covered, and strain."

This infusion is supposed to be anodyne. It is lightly tonic, and forms a good vehicle for more powerful agents. The dose is f ℥ j. to f ℥ ij.

INFUSUM MENTHÆ SIMPLEX, Dub. *Simple Infusion of Mint.*

"Take of dry leaves of mint, *two drachms;* boiling water, a sufficient quantity to leave f ℥ vj. of the infusion."

Medical properties and uses.—A common stomachic infusion.

INFUSUM MENTHÆ COMPOSITUM, Dub. *Compound Infusion of Mint.*

"Take of the leaves of spearmint, dried, *two drachms,* boiling water, a sufficient quantity to afford *six ounces* by measure when strained. Digest for half an hour in a covered vessel, and strain the liqour when cold; then add of refined sugar *two drachms,* oil of spearmint, *three drops,* dissolved in *half an ounce* (fluid?) of compound tincture of cardamoms. Let them be mixed."

Medical properties and uses. — This is a grateful stomachic, and is also slightly diaphoretic. It may prove serviceable in anorexia and nausea, and as a vehicle to cover the disagreeable taste of other medicines. The dose may be from f ℥ j. to f ℥ iij. or *ad libitum.*

INFUSUM PAREIRÆ, Lond. *Infusion of Pareira.*

"Take of pareira, *six drachms;* boiling distilled water, *a pint.* Macerate for two hours in a vessel lightly covered, and strain."

It is a useful form of the medicine in catarrhus vesicæ, and other affections of the urinary organs, especially in irritable bladder. The dose is f ℥ j. to f ℥ ij. It may be used as a vehicle for the extract.

INFUSUM QUASSIÆ, Lond. Dub. *Infusion of Quassia.*

"Take of quassia wood, chipped, *two scruples;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

INFUSUM QUASSIÆ EXCELSÆ, Edin. *Infusion of Quassia.*

"Take of quassia wood, rasped, *half a drachm;* boiling water, *eight ounces.* Macerate for two hours in a lightly-covered vessel, and strain."

The active matter of quassia (*quassina*), taken up by water, appears to be a simple bitter. It is not altered by any of the substances usually employed as adjuncts to bitters; and by two only of the metallic salts; namely, nitrate of silver, which throws down soft, yellow flakes; and acetate of lead.

Medical properties and uses. — This infusion is a light tonic, efficacious in dyspepsia, and cases in which tonics are indicated. In hysteria it may be combined with purgatives and tincture of valerian; in atonic gout, with aromatics; and in dyspeptic affections with chalybeates, salts of zinc, or mineral acids. The dose is from f ℥ j. to f ℥ iij. twice or thrice a day.

INFUSUM RHEI, Lond. Dub. *Infusion of Rhubarb.*

"Take of rhubarb, sliced, *three drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

Edinburgh.

"Take of rhubarb root, bruised, *half an ounce;* boiling water, *eight ounces;* spirit of cinnamon, *one ounce.* Macerate the root with the water in a covered vessel for twelve hours; then add the spirit, and strain."

Syn. Infusion de Rhubarbe (*F.*), Rhabarber aufguss (*G.*), Infuso de Rabarbaro (*I.*).

These infusions differ in point of strength; the Edinburgh is rendered pleasanter by the spirituous addition. Neither of them is quite clear; and both have a reddish-brown colour, which is very much deepened by the addition of alkalies. The following substances either occasion precipitates in these infusions, or otherwise alter their properties, and are therefore incompatible in formulæ with them; namely, the strong acids, carbonate of potassa, lime-water, salts of iron, and of zinc, nitrate of silver, bichloride of mercury, acetate and diacetate of lead, and tartar emetic; infusions of catechu, cinchona, and cusparia, solution of gelatin.

Medical properties and uses. — These infusions are good forms for exhibiting rhubarb, when it is intended to act on the bowels: but they are considerably less active than the powder.

The dose of the London infusion may be from f ℥ j. to f ℥ iij. and of the Edinburgh half the quantity, united with neutral salts or aromatics, as circumstances may direct.

INFUSUM ROSÆ COMPOSITUM, Lond. Dub. *Compound Infusion of Roses.*

"Take of the dried red rose, *three drachms;* diluted sulphuric acid, *a fluid drachm and a half* (*three drachms by weight,* Dub.); boiling distilled water, *a pint* (*three pounds by measure,* Dub.); sugar, *six drachms.* Pour the water on the rose petals in a covered glass vessel, and mix in the acid. Macerate for half an hour. Finally, strain the liquor, and add the sugar."

INFUSUM ROSÆ GALLICÆ, Edin. *Infusion of Red Roses.*

"Take of the dried petals of the red rose, *one ounce;* boiling water, *two pounds and a half;* sulphuric acid, diluted, *half an ounce;* refined sugar, *one ounce.* Macerate the petals with water in an earthern vessel, which has not been glazed with lead for four hours; then pour in the acid, strain the liquor, and add the sugar."

Syn. Infusion de Roses (*F.*), Rosen aufguss (*G.*), Infuso di Rose (*I.*).

This infusion is clear, of a beautiful red colour, and has an acid, pleasant, austere taste.[1] The addition of the sugar prevents it from keeping so long as it might otherwise be kept. The incompatible substances are those which are decomposed by the sulphuric acid. The sulphates of iron strike a blue black, and sulphate of zinc, although it does not immediately alter the infusion, yet slowly produces a dark-coloured precipitate after some hours.

Medical properties and uses. — Infusion of roses is indebted for any astringency it possesses chiefly to a small portion of gallic acid which it contains. It is used in the colliquative sweats of phthisis; and as a gargle in cynanche tonsillaris; but it is chiefly employed as an elegant vehicle for more active remedies, particularly sulphate of magnesia, the nauseous taste of which it completely covers. The dose is from f ℥ ij. to f ℥ iv.

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[1] Dr. Clarke, of Cambridge, supposed that he had detected iron in the petals of the rose.

INFUSUM SCOPARII, Lond. *Infusion of Broom.*

"Take of broom, *an ounce;* boiling distilled water, *a pint.* Macerate for two hours, in a lightly-covered vessel, and strain."

A useful diuretic vehicle for other diuretics. It sometimes purges, in which case it ceases to be diuretic. The dose is f ℥j. to f ℥iv.

INFUSUM SARSAPARILLÆ COMPOSITUM, Dub. *Compound Infusion of Sarsaparilla.*

"Take of the root of sarsaparilla, first softened in cold water, and then cut, *one ounce;* lime-water, *one pint.* Macerate for twelve hours in a close vessel, frequently agitating; then strain."

The active principle of sarsaparilla is soluble in cold water; and on this account, the operose preparations of the decoction may be dispensed with. The use of the lime-water is not satisfactorily explained.

Medical properties and uses.—This infusion possesses all the properties of the decoction. It allays that morbid irritability of habit which remains after a course of mercury; thence it aids the restoration to general health. It is incompatible with sulphates, the salts of lead, and vegetable astringents.

INFUSUM SENNÆ COMPOSITUM, Lond. Dub. *Compound Infusion of Senna.*

"Take of senna, *fifteen drachms* (*one ounce*, Dub.); ginger, sliced, *four scruples;* boiling distilled water, *a pint.* Macerate for an hour in a lightly-covered vessel, and strain."

INFUSUM CASSIÆ SENNÆ, Edin.

"Take of senna leaves, *six drachms;* ginger root, bruised, *a scruple;* boiling water, *nine ounces.* Macerate for an hour in a lightly-covered vessel, and strain."

Syn. Infusion de Séné (*F.*), Senna aufguss (*G.*), Infuso di Senna (*I.*).

This infusion should be clear; have a deep red-brown colour, and a slightly bitter, mawkish taste, which is scarcely corrected by the aromatic. In warm weather it spoils in forty-eight hours; and by simple exposure to the air attracts oxygen, which occasions a yellowish precipitate of oxidized extractive, which is not purgative, but gripes violently. On this account it should be preserved in a well-closed vessel, or made only when it is wanted. Dr. Paris (*Pharmacologia*) observes, that the nauseous taste of this infusion is completely covered by the addition of *Bohea tea.* Decoction of guaiac is said to increase its powers, and to render it milder. Camphor mixture augments its activity. It is precipitated by the strong acids, the alkaline carbonates, lime-water, solutions of nitrate of silver, bichloride of mercury, acetate and diacetate of lead, tartar emetic, and infusion of yellow cinchona bark, which are consequently incompatible in formulæ with these infusions.

Medical properties and uses. — This infusion contains all the purgative principles of the plant, whilst the aromatics correct its griping properties: but there is a waste of senna in the London formula. It would be better to pulverize the leaves, and macerate the powder in water at 160°: all the active matter is dissolved, and little of the griping part of the leaf. It is given generally combined with neutral salts and manna. The dose of the simple infusion may be from f ℥ ij. to f ℥ iv.; but with the addition of ʒ j. of the tartrate of potassa, or ʒ iij. of the sulphate of magnesia, which are the usual adjuncts, f ℥ ij. are sufficient.

INFUSUM SENNÆ COMPOSITUM, Edin. *Infusion of Tamarinds and Senna.*

"Take of preserved tamarinds, *one ounce;* senna leaves, *one drachm;* coriander seeds, bruised, *half a drachm;* raw sugar, *half an ounce;* boiling water, *eight ounces.* Macerate in a covered earthen vessel, which is not glazed with lead, shaking frequently, and, after four hours, strain.

"It may be made also with double or triple the proportion of senna."

INFUSUM SENNÆ CUM TAMARINDIS, Dub. *Infusion of Senna and Tamarinds.*

The same as the Edinburgh formula.

These infusions are pleasanter than the simple infusions, the nauseous taste being well covered by the sugar and the acid of the tamarinds; in other respects they agree both in their properties and in the effects of the incompatible substances; to which, however, must be added all salts having potassa for their base.

INFUSUM SERPENTARIÆ, Lond. *Infusion of Serpentaria.*

"Take of serpentaria, *half an ounce;* boiling distilled water, *a pint.* Macerate for four hours in a lightly-covered vessel, and strain."

This infusion is a stimulating, diaphoretic tonic. It is advantageously administered in low fevers. The dose is f ℥ ss. to f ℥ ij.

INFUSUM SIMAROUBÆ, Lond. Dub. *Infusion of Simaruba.*

"Take of simaruba, bruised, *three drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

This infusion is inodorous; has a slightly bitter, astringent taste, is clear, and of a greenish straw-colour. The alkaline carbonates and lime-water render it milky; nitrate of silver, bichloride of mercury, acetate and diacetate of lead, infusions of galls, catechu, and yellow cinchona bark, precipitate it.

Medical properties and uses. — Simaruba infusion possesses the same properties as the bark, and is the best form of exhibiting the remedy, but it is not much used in this country. The dose is f ℥j. to f ℥ij., combined with tincture of opium, or an aromatic.

INFUSUM TABACI, Dub. *Infusion of Tobacco.*

" Take of tobacco leaves, *a drachm;* boiling water, *a pint.* Macerate for an hour in a lightly-covered vessel, and strain."

This infusion is clear, of a reddish-brown colour; has the odour of the plant in a slight degree, and a hot, very acrid taste.

Medical properties and uses. — Tobacco infusion is chiefly intended to be given under the form of enema; for although it has been occasionally employed as an emetic, it cannot be recommended. As an enema it has been found useful in ileus, colica pictonum, incarcerated hernia and dysury: the practice of employing it in cases of suspended animation is justly condemned.

INFUSUM VALERIANÆ, Lond. Dub. *Infusion of Valerian.*

" Take of valerian, *half an ounce;* boiling distilled water, *a pint.* Macerate for two hours, in a lightly-covered vessel, and strain."

Valerian infusion is clear, of a pale brown colour; with the odour of the valerian, and a bitterish, pungent taste. Solutions of nitrate of silver, sulphate of iron, and infusion of yellow cinchona, afford precipitates with this infusion; and are therefore incompatible in formulæ with it.

Medical properties and uses. — This is an useful form of giving valerian in hysterical and nervous affections, in which the stomach will not always bear the powder. The dose may be from f ℥jss. to f ℥ij., twice or thrice a day.

AQUA CALCIS COMPOSITA, Dub. *Compound Lime-water.*

" Take of raspings of guaiacum wood, *half a pound;* liquorice root, sliced and bruised, *an ounce;* sassafras bark, bruised, *half an ounce;* coriander seeds, *three drachms;* lime-water, *six pints.* Macerate without heat for two days, and strain."

This is a very inert preparation; and, unless great care be taken to exclude the air completely from the vessel in which it is made, the lime-water will be decomposed.

AQUA PICIS LIQUIDÆ, Dub. *Tar-Water.*

"Take of tar, *two pints;* water, *a gallon.* Mix, stirring with a wooden rod for a quarter of an hour; then, after the tar shall have subsided, let the liquor be strained, and preserve in well-corked bottles."

Water readily dissolves a portion of tar; and is impregnated with empyreumatic oil, a small portion of resinous matter, and acetic acid, the components of the tar. The solution has the colour of Madeira wine, and a sharp, empyreumatic taste.

Medical properties and uses. — Tar water is stimulant and diuretic; but, as a diuretic, its operation requires to be aided by bodily exercise. It may prove useful in scurvy, and some cutaneous diseases; but the reputation which it obtained on the faith of the judgment of the worthy Bishop of Cloyne[1] has long since been lost. It is now scarcely ever employed. From O j. to O ij. may be taken in the course of a day.

LINIMENTA.

LINIMENTS.

THESE are compositions which have the consistence of oil or balsam; so as to allow them to be easily rubbed upon the skin. They are in general more active remedies than cerates or ointments; and act as local stimulants, relieving deep-seated inflammations and pains.

LINIMENTUM ÆRUGINIS, Lond. *Liniment of Verdigris.*

"Take of verdigris, powdered, *an ounce;* vinegar, *seven fluid ounces;* honey, *fourteen ounces.* Dissolve the verdigris in the vinegar, and strain it through linen; then, having added the honey, boil down to a proper consistence."

OXYMEL CUPRI SUBACETATIS, Dub. *Oxymel of Subacetate of Copper.*

"Take of prepared verdigris, *one ounce;* wine vinegar, *seven fluid ounces;* clarified honey, *fourteen ounces.* Dissolve the verdigris in the vinegar, and strain it through a linen cloth: add the honey, and boil the mixture to a proper thickness."

This preparation, which is the *Mel Ægyptiacum* of the old Pharmacopœias, is improperly named a liniment by the

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[1] *Berkley's Siris,* passim.

London College. It is detergent and escharotic; and in the above state is used for taking down fungous flesh; and, considerably diluted, is an useful stimulant to foul ulcers, which it clears and excites to a more healthy action. It has been employed as a gargle in venereal ulcerations of the mouth and fauces; but I cannot recommend it.

LINIMENTUM AMMONIÆ, Lond. *Stronger Liniment of Ammonia.*

"Take of solution of ammonia, *a fluid ounce;* olive oil, *two fluid ounces.* Shake them together until mixed."

OLEUM AMMONIATUM, Edin. *Ammoniated Oil.*

"Take of olive oil, *eight parts;* water of ammonia, *one part.* Mix them."

LINIMENTUM AMMONIÆ, Dub. *Liniment of Ammonia.*

"Take of caustic water of ammonia, *two fluid drachms;* olive oil, *two fluid ounces.* Mix them."

Syn. Liniment volatil (*F.*), Ammonium liniment (*G.*), Linimento volatile (*I.*).

In these preparations a chymical union takes place between the alkali and the fixed oil, and produces a white soap, which is kept fluid by the water of the solution of ammonia. It is an excellent rubefacient, and is efficaciously employed in cynanche tonsillaris, spread on a piece of flannel, and applied round the throat; and to relieve the rheumatic pains it is rubbed upon the skin over the affected part, often with the addition of a little camphor, or, what is preferable, some extract of belladonna. I have found a medium proportion of solution of ammonia, or half a fluid ounce to two fluid ounces of oil, form a preparation better fitted for general use than the above.

LINIMENTUM AMMONIÆ SESQUICARBONATIS[1], Lond. *Liniment of Sesquicarbonate of Ammonia.*

"Take of solution of sesquicarbonate of ammonia, *a fluid ounce;* olive oil, *three fluid ounces.* Shake them together until they unite."

This preparation is also a fluid soap; but the combination of the oil and alkali is less perfect owing to the carbonic acid of the sesquicarbonate. It is also much less soluble in water, and after a little time the soapy matter separates from the water. It is intended for the same purposes as the strong liniment, which can be reduced by the addition of oil; therefore, this may be regarded as a superfluous preparation.

LINIMENTUM AQUÆ CALCIS; sive OLEUM LINI CUM CALCE, Edin. *Liniment of Lime-water.*

"Take of linseed oil, lime-water, of each *equal parts.* Mix them."

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[1] Linimentum volatile, P. L. 1745. Linimentum ammoniæ, P. L. 1787.

LINIMENTUM CALCIS, Dub. *Liniment of Lime.*

"Take of lime-water, olive-oil, of each *three fluid ounces.* Mix them them."

These are solutions of earthy soaps, formed by the chymical union of the lime and the oil. They are thick, of a white colour, devoid of acrimony; and are very advantageously applied to burns and scalds. The soapy matter separates from the water, when the liniment is kept for a little time; it is always better, therefore, to prepare it only when it is wanted.

LINIMENTUM CAMPHORÆ, Lond. *Liniment of Camphor.*

"Take of camphor, *half an ounce;* olive oil, *two fluid ounces.* Dissolve the camphor in the oil."

OLEUM CAMPHORATUM, Edin. *Camphorated oil.*

"Take of camphor, *an ounce;* olive oil, *four fluid ounces.* Dissolve the camphor in the oil."

OLEUM CAMPHORATUM, Dub. *Camphorated oil.*

"Take of camphor, *half an ounce;* olive oil, *two fluid ounces.* Rub them together."

These solutions of camphor in fixed oil are useful embrocations to glandular swellings, sprains, bruises, and to joints affected with rheumatic pains. Mr. Ware recommends them, with the addition of half an ounce of the solution of sesquicarbonate of potassa, to be applied to the eyelids night and morning in incipient amaurosis.

LINIMENTUM CAMPHORÆ COMPOSITUM. Lond. Dub. *Compound Liniment of Camphor.*

"Take of camphor, *two ounces and a half;* solution of ammonia, *seven fluid ounces and a half;* spirit of lavender, *a pint.* Mix the solution of ammonia with the spirit; then from a glass retort, by a gentle heat, distil a pint. Lastly, in this dissolve the camphor."

This is a very useful stimulant application to sprains, bruises, and rheumatic pains. It is also an excellent vehicle for introducing opium into the habit by means of friction. An embrocation composed of f ℥jss. of this liniment, and f ℥ss. of tincture of opium, warmed, and rubbed over the surface of the abdomen, quickly allays the pains of flatulent colic.

LINIMENTUM HYDRARGYRI COMPOSITUM, Lond. *Compound Liniment of Mercury.*

"Take of the stronger mercurial ointment, lard, of each *four ounces;* camphor, *an ounce;* rectified spirit, *a fluid drachm;* solution of ammonia, *four fluid ounces.* First rub the camphor with the spirit, then with the lard and mercurial ointment; lastly, drop in gradually the solution of ammonia, and mix the whole."

This liniment is stimulant and discutient. It is employed as an embrocation to parts affected with chronic venereal pains, nodes, and tophi; to indolent swellings, and to discuss morbid collections of fluid. One drachm should be rubbed on the affected part night and morning. When largely used, although it does not so freely enter the system, yet it salivates sooner than mercurial ointment.

LINIMENTUM OPII, Lond. *Liniment of Opium.*

"Take of liniment of soap, *six fluid ounces;* tincture of opium, *ten fluid ounces.* Mix."

A useful liniment in local pains, and to procure sleep when opiates taken into the stomach disagree.

LINIMENTUM SAPONIS[1], Lond. Dub. *Compound Soap Liniment.*

"Take of hard soap, *three ounces;* camphor, *an ounce;* spirit of rosemary, *sixteen fluid ounces.* Dissolve the camphor in the spirit; then add the soap, and macerate in the heat of a sand bath, until they be dissolved."

TINCTURA SAPONIS CAMPHORATA: vulgo, LINIMENTUM SAPONACEUM, Edin. *Camphorated Tincture of Soap;* commonly called *Liniment of Soap.*

"Take of hard soap, sliced, *four ounces;* camphor, *two ounces;* volatile oil of rosemary, *half an ounce;* alcohol *two pounds.* Digest the soap in the alcohol for three days, then add the camphor and the oil, frequently shaking the mixture."

Syn. Kampferliniment (*G.*).

These preparations are stimulant and anodyne, and may be advantageously applied against local pains, and in bruises, rubbed upon the parts.

TINCTURA SAPONIS ET OPII; vulgo, LINIMENTUM ANODYNUM, Edin. Dub. *Tincture of Soap and Opium;* commonly called *Anodyne Liniment.*

"Take of hard soap, sliced, *four ounces;* opium, *one ounce;* camphor, *two ounces;* oil of rosemary, *half an ounce;* alcohol, *two pounds.* Digest the soap in the alcohol for three days; then to the strained solution add the camphor and the oil, frequently shaking the mixture."

The addition of the opium to the soap liniment renders it in many cases of rheumatism and local pains more useful than the simple liniment; but a decomposition takes place, and, therefore, if any effect is particularly desired from the external application of opium, it will be obtained with more certainty by dissolving the opium in olive oil.

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[1] Linimentum saponaceum, P. L. 1745. Lin. Saponis compositum, P. L. 1824.

LINIMENTUM TEREBINTHINÆ, Lond. Dub. *Turpentine Liniment.*

"Take of cerate of resin, *a pound ;* oil of turpentine, *half a pint.* Melt the cerate; then add to it the oil of turpentine, and mix them."

This liniment was introduced into practice by Dr. Kentish, at that time a surgeon in Newcastle, as a dressing to burns immediately after they happen, and until the loosening of the eschars. Dr. Kentish's plan was first to bathe the parts with warm oil of turpentine, and then to apply over them plasters, thickly spread, of this liniment; at the same time that he supported the strength with wine, opium, and cordials. After the life of the parts appeared to be restored, purges were given, the cordials omitted, and mild emollient dressings applied. We have had several opportunities of witnessing the good effects of this plan of treatment.[1]

METALS.

Metallic Preparations.

The pure metals exert no action on the animal system; for, although iron be administered in its metallic state, yet it must be changed by acid in the stomach to the state of an oxide before it can prove active as a remedy. Tin operates only by mechanical attrition; and mercury, which has also been given internally in the metallic form, on mistaken principles, cannot act otherwise than as a mechanical substance: but when metals suffer oxidizement, or are changed by acids to the state of salts, they constitute a class of remedies of great activity and importance. The following are employed as remedies: —

a. in a metallic state.

IRON, MERCURY, TIN:

b, variously combined with oxygen, chlorine, iodine, bromine, cyanogen, sulphur, and acids.

ALUMINIUM,	CALCIUM,	MERCURY,
ANTIMONY,	COPPER,	POTASSIUM,
ARSENIC,	IRON,	SODIUM,
BISMUTH,	LEAD,	SILVER,
BARIUM,	MAGNESIUM,	ZINC.

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[1] *Essays on Burns, &c.* by Edward Kentish, 1797 and 1800.

The union of oxygen with a metallic base is denominated oxidizement, and the resulting compound an *oxide*. This combination, for medicinal purposes, is effected in four ways: 1. By the action of atmospheric air, aided by an increased temperature; 2. by deflagration with nitrate of potassa; 3. by the action of water; and, 4. by solution in an acid, the acid being afterwards abstracted by an alkali, or some substance for which it has a greater affinity than it has for the oxide of the metal. In whatever manner the oxidizement is effected, metals in changing to oxides lose their lustre, tenacity, inflammability, and other metallic properties; and are gradually converted into earthy-like substances, the weight of which is greater than that of the portion of metal employed. Different metals combine with different quantities of oxygen, which is even the case with the same metal: the maximum and minimum of oxidizement is expressed by the terms *protoxide* to signify the lowest degree of oxidizement; *peroxide* the highest; and *deutoxide, tritoxide*, &c. the intermediate degrees. Some metals are capable of so high a degree of oxidizement as to acquire acid properties. The activity of the oxides of metals on the animal system appears to be regulated, with a few exceptions, by the quantity of oxygen with which they are combined; and therefore, as Dr. Murray has justly observed, "when a process for the preparation of any metallic oxide has once been established, and practitioners have become accustomed to its powers and strength, the process ought not to be varied or changed, from the idea of some trivial improvement; as an alteration of circumstances, apparently of little consequence, may give rise to a very important change in the result. And it is nearly demonstrable, that the oxides of a metal formed by different processes, — as, for example, by a process conducted in the humid way, or by one with the application of heat, — cannot be precisely the same."[1]

The oxidizement of metals generally renders them capable of uniting with acids, and forming soluble salts. The METALLIC SALTS, therefore, are oxides combined with acids; and this is the case, whether an oxide previously prepared be dissolved in an acid, or whether the salt be the product of the direct solution of a metal in an acid. In the latter case, the metal first gains oxygen either from the acid itself, or from the water, which is decomposed; and the oxide thus formed is then dissolved by the remainder of the acid. The properties of the metallic salts are much varied by the previous de-

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[1] *System of Mat. Med.* ii. 253.

gree of oxidizement of the metals; and in the preparation of the metallic salts, therefore, strict attention is requisite in following one established and approved process.

No part of chymical and pharmaceutical language is so faulty as the nomenclature of the metallic salts. Thus, although there is no instance of a direct combination of a metal with an acid, yet we have *sulphate of iron*, *nitrate of silver*, *trisnitras bismuthi*, *acetas plumbi*, &c.

Many of the metallic salts are altered by exposure to the atmosphere; some effloresce, some attract moisture, and others are reduced by the action of light: thence all of them ought to be kept in well-stopped glass bottles; and perhaps these should always be either made of dark green glass, or rendered otherwise opaque. In compositions which require these salts to be dissolved in water, *distilled* or *filtered rain water* should always be employed, and much attention is requisite to avoid combining them with incompatible substances, which may either chymically decompose them, or alter their medicinal properties.

Chlorine combines readily with metals at a common temperature, occasionally with violent action and the evolution of light and caloric. The attraction for the base of the metal is often so great that it decomposes oxides: thus when chlorine and lime, or soda, or potassa, or baryta, are brought together at a red heat, oxygen is evolved, and a chloride of the metallic base is formed.

The metallic chlorides are solid bodies; they are fusible by heat and crystallize in cooling, and some of them may be sublimed without change. All of those used in medicine are soluble in water, with the exception of the chloride of mercury; and those which are soluble may be recognized by yielding a white curdy precipitate with nitrate of silver.

Chlorine exerts little affinity for oxides; and Berzelius has attempted to prove that the bleaching solutions are mixtures of a metallic chloride on the chlorate of an oxide; but this opinion must be regarded as still sub judicé.

The chlorides are very active medicines.

Iodine has a powerful affinity for metals, and forms with them compounds capable of sustaining a red heat without decomposition; they are termed *iodides*. When they contain 1 equivalent of iodine, they are termed *protiodides;* when 2 equivalents, *biniodides*. They are all decomposed by chlorine, bromine, and sulphuric and nitric acids. All the iodides are powerful remedies.

Bromine has less affinity for metals than chlorine, but more than iodine. In combining with metals to form bromides, caloric and light are evolved. Only one bromide, namely, that of potassium is contained in the Pharmacopœia; but the bromide of iron is, also, a very active medicine.

Sulphur also combines with the metals, and forms *sulphurets.* They are also formed, when sulphuretted hydrogen gas is thrown into the acid solutions of those metals which have a weak affinity for oxygen; and, as the metallic solutions differ greatly in the degree of facility with which they are thus decomposed, sulphuretted hydrogen gas may be employed, as Proust has shown, for separating different metals held together in the same solutions. The metallic sulphurets are more used for pharmceutical purposes than as remedies, their dose not being easily appreciated, and their effects uncertain. Many of them are natural productions.

Cyanogen, which is a compound of 1 eq. of nitrogen + 2 of carbon, unites with metals, forming *cyanides* and *bicyanides,* according to the quantity of cyanogen, combined with the base.

PREPARATA EX ALUMINIO.

PREPARATIONS OF ALUMINIUM.

ALUMEN EXSICCATUM, Lond. *Dried Alum.*

"Melt alum in an earthen vessel over the fire, and increase the heat until the ebullition cease."

Edinburgh.

"Melt the alum in an earthen or iron vessel, and let it be kept over the fire until it cease to boil; then rub it into a powder."

ALUMEN SICCATUM, Dub. *Burnt Alum.*

"Take of alum, *any quantity.* Expose to the heat of a strong fire in an earthen vessel until it cease to boil; then pulverize it."

Syn. Sulphate d'Alumine Sec (*F.*), Gebrannter Alaun (*G.*), Alume calcinato (*I.*).

In these processes the alum, which is a sulphate of alumina and of potassa, loses its water of crystallization; but if the heat be too great, its acid is partly expelled, and it is partially decomposed. According to Kirwan, alum desiccated at 700° loses more than half its acid. By our experiments, English alum lost 0·43 in a moderate heat, and 0·46 in a red: Levant alum 0·41 in a moderate heat, and 0·44 in a red heat. Chaptal found that in a red heat alum of his own manufacture lost 0·67; Roman alum, 0·50; English, 0·47; and Levant alum, 0·40.

Qualities.—Dried alum has a more astringent taste than the crystallized salt. It is obtained in the form of a light, opaque, white, spongy, friable mass, 100 parts of which consist of 36·25 acid, and 63·75 bases, when it has been exposed to a heat of 700°: but in general, the desiccation being conducted at a lower temperature, the proportion of acid is greater. Dried alum consists of 1 eq. of alumina=51·4+4 of sulphuric acid=160·4+1 of potassa=47·15, making the equivalent 258·95.

Medical properties and uses.—It is chiefly used as an escharotic to destroy fungus in ulcers; but has also been given internally to the extent of ℈j. for a dose in cases of cholic, the pain of which it is said to allay, while at the same time it gently opens the bowels.

LIQUOR ALUMINIS COMPOSITUS, Lond. *Compound Solution of Alum.*

"Take of alum, sulphate of zinc, of each *half an ounce;* boiling water, *three pints.* Dissolve the alum and the sulphate of zinc in the water, and then filter."

This powerful astringent solution has been successfully used in gleets and leucorrhœa; and in some cases of ophthalmia. It requires to be diluted in all these cases, and to be employed with caution. Half an ounce of the solution and six and a half ounces of rose-water form an excellent collyrium in ophthalmia, after local bleeding.

PREPARATA EX ANTIMONIO.

PREPARATIONS OF ANTIMONY.[1]

SULPHURETUM ANTIMONII PRÆPARATUM, Edin. *Prepared Sulphuret of Antimony.*

"Put sulphuret of antimony, rubbed to powder in an iron mortar, and levigated with a little water upon a porphyry stone, into a large vessel; then pour water on it, and, after frequently agitating the vessel, pour it off loaded with the fine powder.

"The coarse powder, which the water cannot suspend, is to be again levigated, and treated in the same manner."

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[1] The London College have wisely discarded the *oxide of antimony* from the list of their preparations. As a remedy it was too violent and uncertain in its operation to be generally employed; and for the composition of any other antimonial preparation it was utterly useless.

Dublin.

"Take of sulphuret of antimony, *any quantity;* let it be reduced to powder, and separate for use the very fine particles, in the manner directed for the preparation of chalk."

Syn. Sulphure d'Antimoine (*F.*), Schwaser Schwefelspeiss-glanz (*G.*), Solfuro d'antimonio depurato (*I.*), Kohul (*Arab.*), Surmah (*Hind.*).

This mechanical preparation is intended to fit the sulphuret for internal use.

Qualities. — Prepared sulphuret of antimony is an inodorous, insipid, blackish, or deep leaden-grey, dull powder, which stains the fingers, and is insoluble in water.

According to the analysis of Dr. Thomas Thomson, sulphuret of antimony is a compound of 100 parts of antimony and 35·572 of sulphur; it is a sesquisulphuret, and consists of 2 equivalents of antimony 125·2 + 3 of sulphur = 48·3, making the equivalent 177·5.

Medical properties and uses. — Sulphuret of antimony is inert, unless it meet with acid in the stomach, in which case it usually operates either as a diaphoretic or a mild cathartic, but occasionally it produces excessive vomiting and purging; thence it is proper to evacuate the stomach and bowels previous to its use. It has been found efficacious in scrofula, gout, chronic rheumatism, and herpetic eruptions; but its beneficial effects are very slowly produced, and consequently the use of the remedy, in order that it may prove serviceable, must be continued for a considerable length of time. The dose is from grs. v. to ℈j. mixed with any convenient vehicle.

Officinal preparations. — *Antimonii Oxysulphuretum,* L. E. D. *Pulvis antimonii compositus,* L. E. D. *Antimonii Oxydum nitro-muriaticum,* D. *Oxydum Antimonii cum phosphate Calcis,* D. *Tartras Antimonii,* D.

ANTIMONII[1] OXYSULPHURETUM, Lond. *Oxysulphuret of Antimony.*

"Take of sesquisulphuret of antimony, in powder, *seven ounces;* solution of potassa, *four pints;* distilled water, *two gallons;* diluted sulphuric acid, as much as may be required. Mix the sesquisulphuret of antimony, the solution of potassa, and the water together, and boil with a gentle fire for two hours, assiduously stirring, and occasionally adding distilled water, so that the same measure may be kept up. Strain the solution, and drop into it gradually as much diluted sulphuric acid as may be necessary for precipitating the oxysulphuret of antimony; then wash away the sulphate of potassa with water, and dry what remains with a gentle heat."

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[1] Formerly, *Sulphur antimonii præcipitatum. Sulphur auratum Antimonii. Antimonii Sulphuretum præcipitatum.*

SULPHURETUM ANTIMONII PRÆCIPITATUM, Edin.

"Take of solution of potassa, *four parts;* water, *three parts;* prepared sulphuret of antimony, *two parts;* diluted sulphuric acid, *a sufficient quantity.* Mix the sulphuret with the solution of potassa and the water, then boil them in a covered iron pot over a gentle fire for three hours, frequently stirring with an iron spatula, and adding water as it may be required. Strain the hot liquor through a doubled linen cloth, and add to it, when strained, as much diluted sulphuric acid as may be necessary for precipitating the sulphuret, which must be well washed with warm water."

SULPHUR ANTIMONIATUM FUSCUM, Dub. *Brown antimoniated Sulphur.*

"Take of prepared sulphuret of antimony, *one part;* water of caustic potassa, *eight parts;* diluted sulphuric acid, *eleven parts, or a sufficient quantity:* add the sulphuret of antimony to the solution of caustic potassa, and boil for an hour. Strain the hot solution through a doubled cloth, and drop into it the sulphuric acid. Wash away the sulphate of potassa with hot water: finally, rub the dried, brown, antimoniated sulphur to powder."

Syn. Soufre doré d'antimoine (*F.*), Gelber Spiessglanzschwefel (*G.*), Zolfo dorato di antimonio (*I.*).

Although the last of these formulæ differs from the two former, the products of all of them are the same, namely, an oxysulphuret of antimony. The following is the theory of its formation:—During the boiling, the potassa and the sesquisulphuret of antimony, are each partially decomposed, and form sulphuret of potassium, and sesquioxide of antimony, mixed with much of the sesquisulphuret dissolved in the potassa. The diluted sulphuric acid, which is added to the strained solution whilst it is hot, combines with the potassa, changing it into the sulphate, and disengaging sulphureted hydrogen gas, whilst the oxide and the sulphuret of antimony are precipitated together, forming the oxysulphuret.

Qualities. — The oxysulphuret of antimony is an orange-coloured powder, slightly styptic to the taste, inodorous, and insoluble in water. It readily catches fire, and burns with a blue and greenish flame, exhaling the odour of sulphurous acid, and leaving the metal after the combustion in the form of a greyish white oxide. It is said to be frequently sophisticated. When pure it does not effervesce with acids, a fact which enables its adulteration with chalk to be readily discovered.

Mr. Phillips regards it as a compound of 12 parts of sesquioxide of antimony, + 76·5 of the sesquisulphuret + 11·5 of water in 100 parts: or its composition is 2 eq. sesquisulphuret=355+1 eq. sesquioxide=153·2 making the equiv. 508·2.

Medical properties and uses. — This preparation of antimony is diaphoretic, expectorant, and emetic, according to the dose. It was formerly much employed in asthma, and in catarrhal affections; but it is uncertain in its operation, and is not much employed in modern practice, unless when combined with mercurials, when it forms a useful alterative in herpetic and other eruptions. It is also occasionally prescribed in conjunction with opium, or other narcotics, and sarsaparilla, in cases of chronic rheumatism. During its use, the patient must avoid taking acids and acidulous salts, as these augment greatly the emetic properties of the preparation. The dose is from gr. j. to grs. iv. in a pill, twice a day.

Officinal preparation. — *Pilulæ Hydrargyri Chloridi comp.*, L.

ANTIMONII OXYDUM NITRO-MURIATICUM, Dub. *Nitro-muriatic Oxide of Antimony.*

"Take of prepared sulphuret of antimony, *twenty parts;* muriatic acid, *one hundred parts;* nitric acid, *one part.* Add by degrees the sulphuret of the mixed acids in a glass vessel; then digest with a gradually augmented heat until the effervescence is completed, and boil for an hour. Pour the strained cooled liquor into a gallon of water. Let the oxide of antimony afterwards subside, and wash it with much water till all trace of acid be gone: finally, dry the oxide in bibulous paper."

This oxide is intended for the preparation of tartar emetic.

ANTIMONII POTASSIO-TARTRAS, Lond. *Potassio-Tartrate of Antimony.*

"Take of sesquisulphuret of antimony, finely pulverised; nitrate of potassa, in powder, of each, *two pounds;* bitartrate of potassa, powdered, *fourteen ounces;* hydrochloric acid, *four fluid ounces;* distilled water, *a gallon.* Mix accurately the sesquisulphuret of antimony and the nitrate of potassa; then add the hydrochloric acid, and ignite the powder, spread upon an iron plate. After the residue is cold, rub it to very fine powder, and wash it frequently with boiling water until it comes off tasteless. Mix the powder thus prepared with the bitartrate of potassa; then boil for half an hour in a gallon of distilled water. Filter while the solution is hot, and set it aside, so that crystals may form. These being removed and dried, again evaporate, that more crystals may form."

TARTRAS ANTIMONII; *olim,* TARTARUS EMETICUS, Edin. *Tartrate of Antimony;* formerly, *Tartar Emetic.*

"Take of sulphuret of antimony, and nitrate of potassa, of each an *equal weight;* bitartrate of potassa, a *sufficient quantity.* Triturate separately the sulphuret and the nitre, and, having mixed them well together, throw them into a red-hot crucible. When the deflagration is finished, separate the red matter from the white crust, and rub it into a very fine powder, which must be washed with several affusions of warm water, and afterwards dried.

"This powder is now to be rubbed together with an equal weight of bitartrate of potassa, and the mixture boiled in a glass vessel, with four times its weight of distilled water, for an hour; then strained through paper, and the strained solution set aside to deposit crystals by evaporation."

ANTIMONII ET POTASSÆ TARTRAS; *sive*, TARTARUM EMETICUM, Dub. *Tartrate of Antimony and of Potassa.*

"Take of nitro-muriatic oxide of antimony, *four parts;* bitartrate of potassa in fine powder, *five parts;* distilled water, *thirty-four parts.* Boil the water in a glass vessel; then gradually add to it the oxide and bitartrate of potassa, previously well mixed together, and boil for half an hour: then filter the solution through paper, so that as it slowly cools crystals may be formed."

Syn. Tartrate de Potasse antimonié (*F.*), Spiessglanz-weinstein (*G.*), Tartaro antimoniato (*I.*).

By all these methods, a little modified, crystallised tartar emetic may be prepared. With regard to the formula of the London College, it is a bad modification of the Edinburgh process. The intention of the addition of the hydrochloric acid is to prevent the formation of sulphuret of potassium, and the presence of free potassa, in the residue of the ignition: but a chloride of antimony is also formed, which in crystallising mixes with the crystals of the tartar emetic, and requires many recrystallisations for their complete separation.

The theory of the other two processes is sufficiently obvious. The object of both is to form a sesquioxide of antimony to unite with the superabundant acid of the bitartrate of potassa so as to form double salt, or a tartrate of antimony and of potassa. The process of the Dublin Pharmacopæia is undoubtedly the best of the three: and it is to be regretted that it was not adopted by the London College. Indeed, it is a misfortune that all the colleges have not concurred in adopting the same preparation of antimony for the formation of this important salt. The sesquioxide, which is the object of all the processes, is a compound of 2 eq. of antimony $= 125{\cdot}2 + 3$ of oxygen, $=$ 24 making the equivalent $= 153{\cdot}2$ ($\dot{\dot{S}}b$).

Qualities. — Tartrate of antimony and potassa is procured in transparent crystals, the general character of which is an octahedron with a rhombic base. They are inodorous, very slightly styptic to the taste, and efflorescent. The salt should be bought in crystals. In powder, it is frequently adulterated with bitartrate of potassa. If a few of the crystals be put into a solution of *sulphuretted hydrogen*, their goodness may be judged of by the quantity of orange-coloured precipitate that forms. When the salt is adulterated with bitartrate of potassa, it is precipitated from its solution in water by spirit. Tartar emetic effloresces, becoming white and opaque, when exposed to the air: if the crystals deliquesce, its purity may be suspected. It is soluble in about 15 parts of water at 60°, forming a perfectly clear, transparent solution; and in 3 parts at 212°, in which crystals form as it cools. It is spontaneously decomposed when kept in aqueous solution; and is also decomposed by heat, the strong acids, the alkalies and alkaline carbonates, the earths, hydrosulphurets, some of the metallic oxides, lime-water, chloride of calcium, and acetates of lead; and also by the decoctions or infusions of many bitter and astringent vegetables, as those of cinchona bark, rhubarb, galls, kino, and catechu; with which, therefore, it ought never to be conjoined in prescriptions. It may, however, be prescribed in conjunction with decoction of oak bark, with nitrate of silver and chloride of barium. It is insoluble in alcohol.

According to the analysis of Thénard[1], the constituents of tartar emetic are 35·4 of tartaric acid, 39·6 of oxide, 16·7 of potassa, and 8·3 of water; a more recent analysis by Dr. Göbel, of Jena, makes them, protoxide of antimony 42·6, tartaric acid 45·0, potassa 9·8, and water 57·5[2]; according to Phillips the proportions are 36·6 of tartaric acid + 13·3 of potassa + 42·6 of sesquioxide of antimony + 7·5 of water in 100 parts. It may be regarded as consisting of 1 equiv. of potassa = 47·15 + 1 of sesquioxide of antimony = 153·2 + 2 of tartaric acid = 132·96 + 2 of water = 18; making the equivalent 351·31. But these analyses are far from being satisfactory.

Medical properties and uses. — This triple salt is emetic, diaphoretic, expectorant, alterative, rubefacient, and sometimes cathartic. It is certainly the most important of the antimonial preparations; and in proper doses may supersede the use of all the others. It is given as an emetic in the commencement of fevers, in doses of from one to two grains dissolved in distilled water. To obtain its diaphoretic effect, the general dose is from one-sixteenth to one-fourth of a grain. Laennec in France, M. Rasori in Italy, and some English physicians besides myself, prescribe it in very large doses, in acute rheumatism, inflammation of the lungs and the pleura, chorea, hydrocephalus, and apoplexy. Laennec, orders from grs. iv.

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1 *Annales de Chimie*, xxxviii. 39.

2 *Schweigger's Journal*, b. vii. p. 71.

to grs. vj. in a glass of infusion of orange leaves, sweetened, and gradually increases the dose. Rasori gives at first grs. xij. during the day, and the same quantity at night, dissolved in a pint of barley water, to be taken in divided doses; and carries it to doses of grs. ij. and a half.[1] I have given it in doses of grs. iij. and iv. in pleurisy, after one blood-letting. The two first doses cause vomiting; but this seldom occurs after the second dose; and full doses may be continued for weeks without any nausea being excited. It should never be ordered when the redness of the tongue indicates an irritable condition of the mucous membrane. It seems to operate, in large doses, by causing a temporary inflammatory state of the mucous surface; and thus acting as a mild but extensive counter-irritant, it suspends inflammatory action in other organs. In small doses, combined with squill, ammoniacum, and camphor, repeated every three hours, it operates as an expectorant. In doses of gr. j. also combined with calomel, it is a powerful alterative in acute rheumatism, and many cutaneous diseases. When ʒij. of it are triturated with ℥j. of lard, and applied to the skin, it causes a pustular eruption, which has proved very serviceable in mania, white swellings, and deep-seated inflammations, as a counter-irritant. Dr. Joseph Tonelli supposes, that independent of the local irritation on the skin, which this ointment produces, it exerts a specific effect on the lungs; owing as he conjectures, to its abstracting a portion of the oxygen which the lungs furnish to the blood.[2] This opinion is purely hypothetical. The effects of this ointment on the lungs, labouring under disease, however, is very wonderful, as I have had many opportunities of proving. On some skins it does not always produce the desired effect, and requires to be aided by the addition of white sugar, as in the following formula: ℞. Antimonii Potassio-tartatris ʒij. Sacchari Albi ʒj. Adipis ʒix. Tere ut fiat unguentum.

When taken in very large doses, tartar emetic acts as a corrosive poison, producing violent vomiting, hiccough, a sensation of burning in the stomach, colic, hypercatharsis, syncope, difficult respiration, convulsions, and death. The treatment consists in evacuating the poison by bland, oily liquids, freely taken; after which decoction of yellow bark should be administered, with opium and local bleedings.[3]

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1 *Arch. Gen. de Med.* May, 1824.
2 *Annali Univ. di Medic.* July, 1824.
3 One fluid ounce of infusion of yellow bark is sufficient to completely decompose ℈j. of emetic tartar.

Officinal preparations. — *Vinum Antimonii Potassio-tartratis*, L. *Vinum Tartratis Antimonii*, E.

VINUM ANTIMONII POTASSIO-TARTRATIS, Lond. LIQUOR TARTARI EMETICI, Dub. *Wine of Potassio-tartrate of Antimony. Solution of emetic Tartar.*

"Take of potassio-tartrate of antimony, *two scruples;* sherry wine, *one pint.* Dissolve the potassio-tartrate of antimony in the wine.

VINUM TARTRATIS ANTIMONII[1], Edin. *Wine of Tartrate of Antimony.*

"Take of tartrate of antimony, *twenty-four grains;* Spanish white wine, *one pound.* Mix, so that the tartrate of antimony may be dissolved."

In the former edition of the London Pharmacopœia, the name *Vinum* was restored, although the wine was rejected! In the present the use of the wine has been properly re-adopted.

These solutions, when newly made, are equal in point of strength, f ℥ j. of each containing grs. ij. of potassio-tartrate of antimony. When wine is used, a slow decomposition of the salt occurs: the precipitate appears to be an oxide of antimony, with a portion of bitartrate of potassa; arising, perhaps, from the potassa attracting tartaric acid from the wine. Dr. Paris remarks, that when *good* sherry wine is employed, no decomposition of the salt takes place; and if any precipitate occur, it is tartrate of lime, arising from an accidental impurity in the bitartrate of potassa of the preparation.[2]

Medical properties and uses. — These solutions are diaphoretic or emetic, according to the extent of the dose. In doses of ♏ x. to f ʒ j. in any proper vehicle, repeated every three or four hours, they usually excite diaphoresis; but they are principally used as emetics for infants, a tea-spoonful being given every five minutes until vomiting be excited.

PULVIS ANTIMONII COMPOSITUS, Lond. *Antimonial Powder.*

"Take of sesquisulphuret of antimony in powder, *a pound;* horn shavings, *two pounds.* Mix, and throw them into a red-hot crucible, assiduously stirring until vapours cease to arise. Rub what remains to powder, and having put it into a proper crucible, expose it to a fire, which is to be gradually raised, so as to keep it at a red heat for two hours. Triturate the residue into very fine powder.

OXIDUM ANTIMONII CUM PHOSPHATE CALCIS; *olim*, PULVIS ANTIMONIALIS, Edin. *Oxide of Antimony with Phosphate of Lime;* formerly *Antimonial Powder.*

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[1] Vinum Antimonii tartarizati, P. L. 1787.

[2] *Pharmacologia.*

"Take of sulphuret of antimony in coarse powder, hartshorn shavings, each *equal parts*. Mix, and throw them into a wide iron pot, heated to redness, and stir them assiduously until they are burnt into a matter of a grey colour, which remove from the fire, rub to powder, and put into a coated crucible, over which another crucible having a small hole in its bottom is to be inverted and luted: then apply the fire, which is to be gradually raised to a white heat, and kept at this increased heat for two hours. Finally, reduce the matter when it is cold to a very fine powder."

PULVIS ANTIMONIALIS, Dub. *Antimonial Powder.*

"Take of sulphuret of antimony in coarse powder, *one part;* hartshorn shavings, *two parts.* Throw the mixture into a wide iron pot heated to redness, assiduously stirring until the sulphurous vapours cease to be extricated, and the matter acquire a grey colour. Rub the mass to powder when it is cold, and put it into a coated crucible; over which invert another crucible having a small hole in its bottom, and lute the two firmly together. Roast the matter with a heat gradually raised to whiteness for the space of two hours; and lastly, when it is cold, grind it to a very fine powder."

In these processes, by the first exposure of the materials to the action of heat, the gelatin and the other principles of the hartshorn, except the phosphate of lime, are decomposed and dissipated; the sulphur of the sulphuret of antimony is at the same time expelled, and the metal is oxidised, the oxidisement being favoured by the frequent stirring. By the subsequent application of heat, the oxidisement of the metal is rendered more complete, and antimonious acid is formed. The phosphate of lime is merely mechanically mixed with the acid. In the Dublin formula, the boiling of the hartshorn shavings ordered is unnecessary, as the heat effectually decomposes the gelatin, which is the only part of them that can be extracted by the boiling. There is great uncertainty in this preparation. In two specimens analysed by Mr. Phillips, the one yielded 35, and the other 38 per cent. of antimonious acid. According to that chemist, the antimonial powder is a compound of 1 eq. of antimonious acid $=161{\cdot}2+1$ of phosphate of lime $=$ 99·9, making the equiv. 260·11.

From this uncertainty of uniformity in a preparation by the agency of fire, Mr. Chenevix proposed the substitution of a powder prepared according to the following formula: — Let equal parts of white oxide of antimony and of phosphate of lime be dissolved in the smallest possible quantity of hydrochloric acid, and pour the solution into a sufficient quantity of distilled water containing pure ammonia in solution. A powder precipitates, which is a mechanical mixture of chloride of antimony and phosphate of lime.[1] The process by heat, however, is still continued in the pharmacopœias, from a desire of imitating, as closely as possible, the celebrated empirical preparation of Dr. James, "James's Powder," as a substitute for which this preparation was first introduced: and which, according to the analysis of Dr. Pearson, consists of 43 parts of phosphate of lime, and 57 of oxide of antimony, in 100 parts; or, according to Mr. Phillips, of 56 of antimonious acid + 44 of phosphate of lime, in 100 parts.[2]

Qualities. — The antimonial powder of the pharmacopœias is inodorous and insipid, of a dull white colour, insoluble in water, and only partially soluble in acids: in this particular differing from the powder of Chenevix, which is soluble in every acid that can dissolve either of its components. Both differ from the true James's powder, in which I have found a protoxide of antimony, to which it owes its efficacy, whilst the antimonial powder contains antimonious acid, which is inert.

Medical properties and uses. — Antimonial powder is intended to operate as a diaphoretic, alterative, emetic, or purgative, according to the extent of the dose, and the state or habit of the patient to whom it is administered. It is the preparation of antimony which was, until lately, most commonly employed in the commencement of fevers, and in inflammatory affections; being generally given with a view to its diaphoretic effect: and it is true that when a copious perspiration is early induced, after having previously evacuated the stomach and bowels, fevers of the most threatening aspect are often cut short by it; but too often it fails in producing this result, and, according to Dr. Elliotson's experiments, 100 grains have been given without producing any effect. That the specimens, which I have employed, have sometimes produced the intention expected, I can bear testimony: but justice obliges me to acknowledge that I have been as often disappointed; and every object for which antimonial powder can be prescribed is more certainly obtained from the employment of small doses of tartar emetic. Supposing that it is properly prepared, and acts like true James's powder, I should say, that those labouring under inflammatory diseases, who can bear considerable discharges by stool, experience the

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[1] *Phil. Mag.* xi. 110.

[2] *Phil. Trans.* lxxxi. 317. Another analysis of this powder has been published lately by M. Pully, an Italian chymist, who gives the following as its constituents: seven parts of protoxide of antimony, four of phosphate of lime, four and a half of sulphate of potassa, and three and a half of potassa, holding in solution protoxide of antimony. *Annales de Chimie*, lv. 74. *Thomson's Chemistry*, 4th ed. iii. 315.

most benefit from the use of the antimonial powder, particularly when venesection has been previously employed. In acute rheumatism it is advantageously given, combined with camphor, calomel, and opium; and with calomel and guaiacum in several cutaneous affections. As it is insoluble in water, it is given either in the form of a powder, or made up in pills. The dose is from grs. iij. to ℈j., repeated every fourth hour, diluting freely in the intervals, until its diaphoretic effects are obtained.

PRÆPARATA EX ARGENTO.

PREPARATIONS OF SILVER.

ARGENTI NITRAS, Lond.[1] *Nitrate of Silver.*

"Take of silver, *an ounce and a half;* nitric acid, *one fluid ounce;* distilled water, *two fluid ounces.* Mix together the nitric acid and water, and dissolve the silver in the mixture on a sand bath. Then gradually increase the heat, that the nitrate of silver may be dried. Melt this in a crucible with a gentle fire, until, the water being evaporated, the ebullition ceases: then directly pour it into proper moulds."

NITRAS ARGENTI, Edin. *Nitrate of Silver.*

"Take of pure silver, flatted into plates and cut, *one part;* nitric acid diluted, *two parts;* distilled water, *one part.* Dissolve the silver in the acid and water previously mixed together, in a phial, with a gentle heat, and evaporate the solution to dryness. Then put the mass into a large crucible, and place it on the fire, which must be first gentle, and gradually increased until the mass flow like oil; then pour it into iron pipes, previously heated and rubbed with grease. Finally, let the preparation be preserved in a well-stopped glass vessel.

ARGENTI NITRATIS CRYSTALLI, Dub. *Crystals of Nitrate of Silver.*

"Take of silver, flatted into plates and cut, *thirty-seven parts;* nitrous acid, *sixty parts.* Put the silver into a glass vessel, and pour over it the acid, previously diluted. Then dissolve the metal with a gradually raised heat, and evaporate the solution till crystals are formed on cooling it. These are to be dried without heat, and preserved in a glass vessel in an obscure place."

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[1] Argentum nitratum, P. L. 1787.

ARGENTI NITRAS FUSUM, Dub. *Fused Nitrate of Silver.*
"Dissolve the silver in diluted nitric acid, in the manner above described; then evaporate the solution to dryness. Put the mass which remains into a crucible, and liquefy it over a slow fire. Finally, pour it into proper moulds, and preserve it in glass bottles."

Syn. Nitrate d'Argent (*F.*), Saltpetersaures Silber (*G.*), Nitrato di argento (*I.*).

In this process the acid is partly decomposed by the silver which is oxidised, and the oxide dissolved as it forms in the remaining acid. One atom of silver takes one of the oxygen of the acid; this forms the oxide, which requires one atom of nitric acid to form it into the nitrate. The effervescence is very violent, owing to the extrication of the nitrous gas (binoxide of nitrogen) of the decomposing acid, which flies off in orange-coloured fumes; part, however, is retained in the solution, and gives it a greenish-blue colour, which goes off as it cools. In this stage of the process, the silver held in solution is in the state of an oxynitrate, which, by due evaporation, may be obtained in brilliant, thin, right rhombic plates, having an intensely bitter metallic taste: and although by the subsequent melting a part of the acid is expelled, yet it is probable that the product is not reduced to the state of a subnitrate.

The difference in the quantity of acid ordered in the above formulæ does not alter the nature of the product; but it is of some consequence, in an economical point of view, to know, that, even in the London formula, the quantity of acid is too great, ten fluid drachms being amply sufficient for the solution of two ounces of silver. Several minute particulars are necessary to be attended to in conducting the process. The silver should be perfectly free from any alloy of copper, which renders the salt more or less deliquescent. Its presence is indicated when the solution remains of a permanently greenish-blue colour; in which case it may be purified by repeated solutions and crystallisations, as long as tabular crystals are produced, and nitrate of copper being left in the mother-water. The acid employed should also be pure; for if hydrochloric or sulphuric acids be present, the solution is rendered turbid by the formation of a precipitate of sulphate and chloride of silver. For the same reasons the water should be pure; therefore, distilled water, or filtered rain water, should be employed. The granular form of the silver is preferable to the laminated form. For the subsequent evaporation and melting, a porcelain crucible should be used, as the fused silver is apt to sink into the substance of the common crucibles: it should be of ample size, to allow of the swelling and ebullition. The heat should not exceed 426°, nor be continued after the fusion is complete; for by continuing the application of heat, the nitric acid is expelled, and the nitrate partially reduced: but it should be directly run into the iron moulds, or into a mass of well-tempered pipe-clay, perforated by means of a greased quill. The iron mould should be previously heated, to prevent the sticks of nitrate of silver from becoming too brittle; and when cold, each piece must be cleansed from the grease, and separately rolled up in clean white paper.

Qualities. — Fused nitrate of silver is in small, solid cylinders of a white colour, presenting, when broken across, a crystallised structure. It is inodorous; has an intensely bitter, metallic, caustic taste, and tinges the skin black, and hair red wherever it touches, owing to the reduction of the nitrate by its extension. It should not be deliquescent: the presence of copper in the preparation may always be suspected when this occurs. Copper may also be detected by putting a piece of the suspected nitrate into liquor ammoniæ, which will form a blue solution if copper be present. It is soluble in an equal weight of water at 60°, and is also soluble in four times its weight of alcohol. It is not blackened and reduced by exposure to light unless some vegetable matter be present; but it is decomposed by a strong heat, by phosphorus, hydrogen gas, and the hydrosulphurets; is precipitated from its aqueous solution by mercury, copper, and some other metals; and is decomposed by the alkalies and their carbonates, with the exception of ammonia; by the alkaline earths, sulphuretted hydrogen, the hydrosulphurets, the sulphuric, hydrochloric, and arsenious acids, the majority of the neutral salts, and by astringent vegetable solutions and hard water. The constituents of 100 parts are, 31·39 of oxide of silver, and 68·39 of nitric acid[1]; or 1 prop. of crude silver $=$ 116 $+$ 1 of nitric acid $=$ 54·15: making the equivalent 170·15. (Ag. + $\overset{\cdot\cdot\cdot}{\text{N}}$.)

Medical properties and uses. — Nitrate of silver is tonic, antispasmodic, and escharotic. It was introduced as an internal remedy by Angelus Sala, in the commencement of the 17th century. It is said to prove efficacious in epilepsy, in angina pectoris, and in chorea. In these cases it is given in doses of one-eighth of a grain, gradually increased to grs. iv. or more, three times a day; but little advantage is gained, unless its use be preceded by a course of purgatives. The chief objection to the internal administration of nitrate of silver is the discoloration of the skin which it sometimes produces: but M. Sementini says, that this may be averted by

[1] *Phillips.*

the patient avoiding the light of sunshine.[1] The cause of this colour is, in my opinion, the change of the nitrate into the chloride, in the cellular tissue. I am satisfied that nitric acid, highly diluted, and taken freely at the time of administering the nitrate of silver, will prevent the transformation of the nitrate into the chloride, and consequently the discoloration of the skin. How far is it useful, in the same cases, to avoid the use of chloride of sodium? The best form of administering this nitrate is that of pill made with crumb of bread, or any vegetable extract. It may be combined with musk, camphor, and opium.[2] But the chief use of nitrate of silver is an external application to destroy strictures of the urethra, warts, fungous excrescences, and incipient chancres. In solution, in the proportion of gr. ij. to f ℥ j. of distilled water, it forms a good injection in fistulous sores; and, of half the strength, a lotion in an apthous state of the mouth; and in that disease of the gums generally denominated scurvy, in which the gum becomes spongy, and its edges hang loosely about the necks of the teeth. When this latter disease, however, rises to a great height, the sore edges of the gum should be touched with a hair pencil dipped in a much stronger solution, in the proportion of ʒ j. of the nitrate of silver to f ℥ j. of distilled water.[3] A solution of one part of the nitrate in 1000 parts of water is recommended by Hahnemann[4] as an application to old sores, and for healing the ulcers of the mouth produced by the use of mercurials. In the proportion of grs. x. to f ℥ j. of distilled water, it was introduced by Dr. Ridgeway as a remedy in the Egyptian ophthalmia; and has been found very beneficial. One drop or two drops are inserted into the eye every second day.[5] It is the best application to ulcers, when their edges are pencilled with it according to the plan of Mr. Higginbottom. Nothing is more useful in erysipelas; and I have employed it, with unvarying success, in excoriations of the back in tedious illnesses.

When given in too large doses, it acts as a poison on the system, producing symptoms resembling those induced by the other corrosive poisons. M. Orfila regards common salt as the antidote of this poison, when given sufficiently early to prevent the specific action of the nitrate on the coats of the stomach[6]; and so completely is it decomposed by a solution

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1 *Giornale di Fisica*, xi. p. 355.

2 ℞ Argenti Nitratis gr. j., Camphoræ gr. xxiv., Opii Extracti gr. iij., Alcoholis ♏ iij. F. pilulæ sex, Sumatur j. ter quotidie.

3 *Fox on the Natural History and Treatment of Diseases of the Teeth.*

4 *Annales de Chimie*, iii. 308. 5 *Med. and Phys. Journ.* Feb. 1825, p. 122.

6 *Traité des Poisons, &c.* tom. i. p. 49.

of common salt out of the body, that when a saturated solution is mixed with a saturated solution of common salt and filtered, the fluid which passes is perfectly inert. When the antidote has not been administered very early, local and general bleeding, tepid baths, and emollient fomentations and clysters must be employed, if any symptom of abdominal inflammation be perceived.

LIQUOR ARGENTI NITRATIS, Lond. *Solution of Nitrate of Silver.*

"Take of nitrate of silver, *a drachm;* distilled water, *a fluid ounce;* dissolve the nitrate of silver in the water, and filter; then keep it in a well-stopped bottle, excluded from light."

This solution is too strong for any purpose except as an escharotic, or as an application in erysipelas. It is chiefly useful as a test from the chlorides and hydrochloric acid.

ARGENTI CYANIDUM, Lond. *Cyanide of Silver.*

"Take of nitrate of silver, *two ounces and two drachms;* diluted hydrocyanic acid, distilled water, of each, *a pint.* Dissolve the nitrate of silver in the water, and add to them the diluted hydrocyanic acid, and mix. Wash the precipitate with distilled water, and dry it."

In this process a double decomposition takes place; the hydrogen of the hydrocyanic acid combines with the oyxgen of the oxide of silver of the nitrate, whilst the cyanogen, uniting with the silver, forms the cyanide of that metal. As it is insoluble it is precipitated.

Qualities. — This cyanide is in the form of white powder, insoluble in water but soluble in sulphuric and nitric acids, aided by heat, and in ammonia. Hydrochloric acid, sulphuretted hydrogen, and the hydrosulphates decompose it, and hydrocyanic acid is formed. It is a compound of 19·4 parts of cyanogen + 80·6 of silver, in 100 parts; or of 1 eq. of cyanogen = 26·39 + 1 of silver = 108, making the equivalent 134·39 (Ag. cy.)

Medical properties and uses. — Its only use is for the extemporaneous formation of hydrocyanic acid.

PRÆPARATA EX ARSENICO.

PREPARATIONS OF ARSENIC.

ARSENICI OXYDUM ALBUM SUBLIMATUM, Dub. *Sublimed White Oxide of Arsenic.*

"Rub the oxide of arsenic to a coarse powder, and expose it to heat in a proper vessel, guarding against the vapours, that the white oxide of arsenic may sublime."

Syn. Oxide d'arsenique pure (*F.*), Weisses Arsenick (*G.*), Arsenico blanco (*I.*).

The greater part of the arsenious acid found in the shops, is in the form of semivitreous cakes, which are the product of a second sublimation of the acid after it is obtained from roasting ores of cobalt. Although prepared on a great scale, yet it is as pure as sublimation can make it, and therefore this process is superfluous, and has been properly rejected by the London College: it is also not devoid of risk to the operator.

LIQUOR POTASSÆ ARSENITIS, Lond. *Liquor arsenicalis*, Dub. *Solution of Arsenite of Potassa.*

"Take of arsenious acid, broken to pieces; carbonate of potassa, of each *eighty grains;* compound tincture of lavender, *five fluid drachms;* distilled water, *a pint.* Boil the arsenious acid and the potassa with half a pint of the water in a glass vessel until they are dissolved. Add to the solution, when it is cold, the compound spirit of lavender, and finally, as much distilled water as will make the whole accurately up to a pint."

SOLUTIO ARSENICALIS, Edin. *Solution of Arsenic.*

"Take of oxide of arsenic, rubbed to a very fine powder, very pure subcarbonate of potassa, of each *sixty four grains;* distilled water, *fourteen ounces.* Boil them together in a glass vessel until all the oxide be dissolved. Add to the solution, when it is cold, *half an ounce* of compound spirit of lavender, and as much distilled water as will make the whole up to sixteen ounces."

The arsenious acid combines readily with alkalies, forming salts very soluble in water. In the above process, by its combination with the potassa, the carbonic acid is driven off, and a solution is obtained of an uniform strength, by which very minute doses can be correctly and easily apportioned. It was introduced by Dr. Fowler, of Stafford, whose formula the London College has adopted, altering only the proportions of the water and the spirit of lavender, to make up the pint of the solution. The acid employed should be perfectly pure; the best test of which is its complete volatilisation when heated.

Qualities. — This solution has the odour, taste, and colour of the compound spirit of lavender. It is decomposed by lime-water, chloride of calcium, hydrosulphurets, sulphate of magnesia, alum, sulphate of iron, nitrate of silver, and the salts of copper; and instantly forms a copious precipitate when dropped into infusion or decoction of cinchona bark; with which therefore it ought not to be conjoined in extemporaneous prescriptions.

Medical properties and uses. — The arsenical solution, as it is termed, is a powerful tonic and anti-periodic, useful in all the cases in which the acid can be employed. It was introduced by Dr. Fowler as a substitute for the celebrated empirical remedy known under the name of "The Ague Drop," which owes its efficacy to the arsenious acid. In addition to the account we have already given of the medicinal use of this acid, we have to add, that we have given this solution with decided advantage after cupping and purging, in threatened apoplexy, when the strength was little and the complexion pale. The dose is ♏ iv. gradually increased to ♏ xxx., given twice a day.

PRÆPARATA E BARIO.

PREPARATIONS OF BARIUM.

BARII CHLORIDUM, Lond. *Chloride of Barium.*

"Take of carbonate of baryta, broken into small morsels, *ten ounces;* hydrochloric acid, *half a pint;* distilled water, *two pints.* Mix the acid and the water, and to the mixture add gradually the carbonate of baryta. Then apply heat, and when the effervescence has subsided, strain the solution, and boil down, that crystals may form."

MURIAS BARYTÆ, Edin. *Muriate of Baryta.*

"Take of carbonate of baryta, muriatic acid, each *one part;* water, *three parts.* To the water and the acid, mixed together, add the carbonate broken into small pieces. The effervescence being finished, digest for an hour; then filter, and after due evaporation set the solution apart that crystals may form. Repeat the evaporation as long as any crystals are formed."

"If the carbonate of baryta cannot be procured, the muriate may be prepared from sulphate of baryta in the following manner:—

"Take of sulphate of baryta, *two pounds;* charcoal in powder, *four ounces;* muriatic acid, a *sufficient quantity.* Roast the sulphate, that it may be the more easily reduced to a very fine powder, and mix it with the powder of charcoal. Put the mixture into a crucible, and having fitted to it a cover, let it be exposed to a strong fire for six hours; then, having well triturated the matter, put it into six pounds of boiling water, in a glass or earthen vessel, and mix by agitation, preventing, as much as possible, the action of the air.

"Let the vessel stand in a vapour-bath until the undissolved part shall have subsided, and then pour off the liquor. Pour upon the residue four pounds of boiling water, which, after agitation and subsidence, add to the former liquor; and then, while it is still hot, or, if it shall have cooled, after it is again heated, let muriatic acid be dropped into it as long as any effervescence is excited. Then let the solution be filtered and evaporated, that crystals may be formed."

BARYTÆ MURIAS, Dub. *Muriate of Baryta.*

"Take of sulphate of baryta, *ten parts;* of wood charcoal, rubbed into a fine powder, or of lamp-black, *one part.*

"Torrefy the sulphate of baryta in the fire, and put it into water whilst it is candescent; then rub it into a fine powder, in the manner ordered for prepared chalk.

"Mix the powders intimately, and expose the mixture to a strong heat for four hours, until it become white-hot. The mass being cooled, dissolve it in boiling water, ten times the weight of the sulphate of baryta, and filter the solution. Add to this as much muriatic acid as will saturate the baryta, guarding against the vapour. Then strain the solution, and by means of evaporation and refrigeration crystallise."

Syn. Muriate de Baryte (*F.*), Salzsaure Schwererde (*G*), Muriato di Barita (*I.*), Zoutzuure Zuaaraarden (*Dutch*).

The simplicity of these processes recommends them. The hydrochloric acid first effects the decomposition of the carbonate of baryta, evolving the carbonic acid: both the acid and the baryta are next decomposed, and water and chloride of barium formed. The last process, however, may sometimes be required to be performed: it is somewhat complicated, but the theory is sufficiently obvious.

The charcoal, by the assistance of heat, decomposes the sulphuric acid of the sulphate of baryta, attracting its oxygen, and forming with it carbonic acid, which is dissipated in a gaseous form, while the sulphur remains united with the barium. The boiling water added to this sulphuret dissolves it; but during the solution, the water is partially decomposed: a portion of the sulphur attracts the oxygen of the decomposed water, and forming sulphuric acid, this unites with a little of the baryta formed by the attraction of the barium for oxygen, so as to reproduce some sulphate, which precipitates; while its hydrogen unites with another portion of the sulphur, and forms sulphurretted hydrogen, the combination of which with the remaining sulphuret converts it into a hydrosulphuret, and prevents its further decomposition. Lastly, the hydrochloric acid added to the hot aqueous solution of these sulphurets is decomposed, and precipitates the sulphur; while at the same time the chlorine unites with the metal, and chloride of barium remains in solution.

Several other methods have been proposed for the preparation of this salt. The following is that recommended by Bouillon La Grange[1]:—Pulverise together equal parts of sulphate of baryta and chloride of calcium, project the mixture into a red-hot crucible, and let the fire be continued till the whole be melted, which is then to be poured out on a heated tile. After it is cold, reduce the mass to powder; boil it for some minutes in six times its weight of distilled water, and filter the solution; then evaporate the liquor to a pellicle, and set it aside to crystallise. The crystals require to be redissolved and again crystallised, to free them from any of the chloride of lime they may retain on the first crystallisation. The Edinburgh processes, however, are preferable to this of La Grange, as the previous calcination reduces any metallic salts that may be combined with the sulphate; and being thus rendered insoluble, they are separated during the first solution of the sulphuret.[2]

Qualities.—Chloride of barium has an acrid, very nauseous, bitter taste. It crystallises in grouped, quadrangular, tables, bevelled on the edges; transparent, white, and very brilliant; of a specific gravity of 2·8257; and not alterable from exposure to the air. When heated, it decrepitates, becomes opaque, and ultimately melts, but is not decomposed. One part requires three of water at 60° for its solution, and 2·20 of hot water. Its composition, according to Berzelius, is of barium, 65·926, chlorine 34·074; and from the still more accurate experiments of Dr. Turner, it appears to consist of barium 65·984, chlorine 34·016, in 100 parts, or of 1 eq. of barium = 68·7 + 1 of chlorine = 35·42; making the equivalent 104·15. (Ba. Cl.). It is used only for forming the following solution: —

LIQUOR BARII CHLORIDI, Lond. *Solution of Chloride of Barium.*

"Take of chloride of barium, *a drachm;* distilled water, *a fluid ounce.* Dissolve the chloride of barium, and filter."

SOLUTIO MURIATIS BARYTÆ, Edin. *Solution of Muriate of Baryta.*

"Take of muriate of baryta, *one part;* distilled water, *three parts.* Dissolve."

BARYTÆ MURIATIS AQUA, Dub. *Solution of Muriate of Baryta.*

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[1] *Annales de Chimie,* xlvii. 131.

[2] Goetling advises chloride of sodium to be added to the charcoal, by which a smaller quantity of charcoal is capable of reducing a larger quantity of sulphate of baryta. A mixture of one part of the chloride, and two parts of chloride of calcium is sufficient to decompose six of the sulphate.

"Take of muriate of baryta, *one part;* distilled water, *three parts.* Dissolve.

"The sp. gr. of this solution should be 1230."

Syn. Dissolution de Muriate de Baryte (*F.*), Soluzione di Muriato di Barite (*I.*).

Qualities. — This solution is supposed to be a simple solution of the chloride. The old opinion that the chloride decomposing a portion of the water, the hydrogen of which was applied to the chlorine, and the oxygen to the barium, thus forming hydrochlorate of baryta, is set aside. It is limpid, transparent, and colourless; but is rapidly decomposed by the earthy, metallic, and alkaline sulphates and nitrates; the alkaline phosphates, borates, and carbonates, are precipitated in the form of a white powder. Its affinity for sulphuric acid is so great, that as a re-agent it is capable of detecting 0·00009 of that acid in any fluid, forming with it an insoluble compound.

Medical properties and uses. — This solution is stimulant and deobstruent, and in large doses poisonous. It was introduced into practice by the late Dr. Crawford as a remedy for cancer and scrofula; and is strongly recommended by Professor Hufeland in the latter affection, when it attacks organs endowed with exquisite irritability, as the eyes and lungs. Its use was afterwards extended to syphilis. When taken in moderate doses, it appears to increase the secretion by the skin, augments the flow of urine, and improves the tone of the system; but in large doses, it causes violent vomiting, purging, and vertigo; and the most dangerous symptoms are produced. When death is the consequence, it is owing, as Mr. Brodie has ascertained, to the poison acting on the brain and heart. It has undoubtedly been found beneficial in several instances of scrofula, in some cutaneous affections, and in ulcerations connected with elephantiasis; while in syphilis it has the power of suspending some of the symptoms for a short period. But although it be a medicine of some efficacy, yet, to use the words of Mr. Pearson, in whose opinion of its deficient powers as an antisyphilitic we place implicit faith, its "good qualities are uncertain in their operation, and narrowly circumscribed; nor is it a preparation on which great confidence can be placed, for the cure of any disease."[1] The dose requires to be carefully apportioned, and very gradually increased, from ♏ v., which are sufficient at first, until ♏ xx. are taken twice a day, or more, if nausea be not excited.

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[1] *Observations on Remedies for Lues Venerea,* 92.

It is sometimes used externally as an escharotic to fungous ulcers and specks on the cornea.

As antidotes of chloride of barium, when it has been taken as a poison, M. Orfila has proposed the soluble sulphates, "if administered before a quantity of the salt sufficient to exert its fatal influence on the nervous system be absorbed."[1] The best of these is the sulphate of soda.

PRÆPARATUM E BISMUTHO.

PREPARATION OF BISMUTH.

BISMUTHI TRISNITRAS, Lond. *Trisnitrate of Bismuth.*

"Take of bismuth, *one ounce;* nitric acid, *one fluid ounce and a half;* distilled water, *three pints.* Mix six fluid drachms of the distilled water with the nitric acid, and dissolve the bismuth in the diluted acid; then decant the solution. Add to it the remainder of the water, and set it apart that the powder may subside. Next, having poured off the supernatant fluid, wash the trisnitrate of bismuth with distilled water, and dry it with a gentle heat."

Dublin.

"Take of bismuth in powder, *seven parts;* nitric acid diluted, *twenty parts;* distilled water, *one hundred parts.* Add the bismuth gradually to the acid, and dissolve by the aid of heat. Mix the solution with water, wash the precipitate with distilled water, and dry on blotting paper with a gentle heat.

Syn. (*Sub.*) Nitrate de Bismuth, Blanc de Ford (*F.*), Saltpetersaurer Wismuth (*G.*), Termassido Bianco de Bismuto (*I.*).

In this process, the nitric acid is partially decomposed, and the bismuth oxidised; and being thus rendered soluble, in the remainder of the acid a solution of the nitrate of bismuth is obtained. This solution, when filtered, is colourless and transparent; reddens the tincture of litmus, and has a harsh, caustic taste; and, were the process stopped here, crystals of the nitrate might be readily obtained by evaporation. The affinity of the acid for the oxide in the nitrate is, nevertheless, so slight, that it can be separated from it by water; and this is effected in the second part of the process; for the water then added combining with the greater part of the acid, and depriving the fixed oxide of its solubility, this is precipitated, in combination with some water, and the remainder of the

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[1] *Traité de Poisons, &c.* vol. i. p. 182.

acid, forming the trisnitrate of bismuth.[1] It is, in fact, a hydrated oxide of bismuth, combined with a small proportion of the nitric acid. The supernatant fluid contains in solution a nitrate of bismuth, with an excess of acid. The oxide of bismuth consists of 90 parts of bismuth and 10 of oxygen in 100 parts[2], or of 1 eq. of bismuth = 71 + 1 of oxygen = 8, making the equivalent 79: the nitrate consists of 3 eq. of oxide of bismuth = 327, + 1 of nitric acid = 54·15, making the equivalent 291·15.

Qualities. — The trisnitrate of bismuth is a pure white, inodorous, insipid powder. It is soluble in the strong acids, from which it is readily precipitated by water; thence it is insoluble in that fluid, and, for the same reason, in very dilute acids. It is soluble in ammonia, although this salt precipitates it from the nitrate; but is very sparingly soluble in potassa and soda. It is blackened by sulphuretted hydrogen gas, its solution in water, and all the hydrosulphurets. When mixed with charcoal and exposed to a strong heat, the trisnitrate is decomposed, and the bismuth reduced to its metallic state.

Medical properties and uses. — Trisnitrate of bismuth is tonic and antispasmodic. It has been advantageously administered in spasmodic affections, palpitations of the heart, and epilepsy. We have found it extremely beneficial in pyrosis, gastrodynia, and some other varieties of dyspepsia; in which cases we have usually combined it with extract of hops; and when there have been merely atony of the digestive organs, without organic mischief, it has proved almost uniformly successful.[3]

The dose of the trisnitrate is from one grain to twelve or fifteen grains. In very large doses, however, it acts with great violence, producing nausea, vomiting of a white, ropy matter, pains in the stomach, acute colic, heat of the chest, and alarming anxiety; and when these symptoms are accompanied with rigors, sighing, vertigo, and convulsions, the poison always proves fatal. Post-mortem examinations exhibit appearances of inflammation and ulceration of the stomach; inflammation of the duodenum and jejunum: the lungs are gorged with blood of a deep-red colour, so as to resemble liver. It is easy to explain the inflammatory and corrosive effects of the trisnitrate on the coat of the stomach into which it is introduced; but the effect on the lungs is less obviously explained; unless we suppose the poison to act sym-

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[1] It was formerly known by the name of *Magistery of Bismuth.*

[2] *Phillips's Trans. of the Pharm.* 1824.

[3] It was first employed in these cases by Professor Odier of Geneva. See *Manuel de Médecine pratique, &c. par Louis Odier.*

pathetically through the nerves, as well as locally on the animal fibre. In cases of poisoning by trisnitrate of bismuth, both general and local blood-letting must be resorted to; whilst the patient should drink freely of milk and mucilaginous fluids. Fomentations and emollient glysters are also necessary: the degree of inflammation being such as to render the employment of ordinary purgatives hazardous.

When trisnitrate of bismuth has been employed as a poison, it is detected by its chemical properties, and the effects of re-agents upon it. When the whole has been taken, the only certain method of ascertaining the nature of the poison is to dry a portion of the vomited matter, or of the contents of the stomach if it have proved fatal; and to calcine the mass, mixed with charcoal, in a covered crucible, so as to reduce the metal, in which state it is easily recognised.

PRÆPARATA E CALCIO.

PREPARATIONS OF CALCIUM.

CALX, Lond. *Lime.*

"Take of chalk, *a pound;* bruise it into small pieces, and burn it in a strong fire for an hour."

Syn. Chaux vive (*F.*), Kalk (*G.*), Brand ochoslacht kalk (*Swed.*), Calce (*I.*), Calviva (*S. Port.*).

Lime for pharmaceutical purposes is required to be more completely burned than is usually the case with that which is obtained from the kilns; and perhaps it is with this view that the above preparation has been ordered by the London College. It may, however, be observed, that chalk does not afford lime in a state of absolute purity; as it frequently contains silex, alumina, magnesia, and marine shells; and a portion of phosphate of lime, which is not decomposed by the fire. To obtain perfectly pure lime, dissolve white marble in diluted hydrochloric acid, and to the filtered solution add solution of ammonia as long as any precipitate falls: then filter, and decompose the chloride by a solution of pure carbonate of potassa: wash the precipitate, and expose it to violent heat in a platina crucible, till it cease to lose weight. The result is pure lime, fifty-six parts of which should be furnished for every 100 parts of pure white marble used.

Qualities.—Well-prepared lime is of a white colour, moderately hard, slightly sonorous, and brittle. Its specific gravity is 2·3. It is inodorous; has a hot, pungent, bitter taste; on animal matter it operates as a most powerful caustic; it changes the vegetable blues to green, and is infusible. Water poured on it is absorbed with a hissing noise, much heat is evolved, and the lime swells, falls to pieces, and is then said to be slaked; in which state having combined with a portion of the water, it is converted to a *hydrate*, which parts with its water at a red heat. By exposure to the air it attracts carbonic acid, and again returns to the state of a carbonate or limestone. It is an oxide of *calcium*[1], in the proportions of 71·42 of calcium, and 28·58 of oxygen in 100 parts; or 1 equiv. of calcium = 20·5 + 1 of oxygen = 8: but slaked lime, or the hydrate, consists of 75·68 of lime, and 24·32 of water[2]; or one equivalent of lime = 28·5 + 1 of water = 9 = 37·5.

Use. — Lime in this state is chiefly employed for pharmaceutical purposes, and for forming the solution.

Officinal preparations. — *Liquor Calcis*, L. E. D. *Potassa cum Calce*, L. *Calcii Chloridum*, L. *Liq. Calcii Chloridi*, L. E. D. *Liquor Ammoniæ*, L.

LIQUOR CALCIS, Lond. *Lime-water.*

"Take of lime, *half a pound;* boiling distilled water, *twelve pints.* Add a little water to the lime, and when slaked add the remainder of the water, and shake them together; cover the vessel directly, and set it apart for three hours; then preserve the solution upon the undissolved lime in well-stopped glass bottles, and pour off the clear fluid when it is wanted for use."

SOLUTIO CALCIS, sive AQUA CALCIS, Edin. *Solution of Lime, or Lime-water.*

"Take of lime, fresh burnt, *half a pound.* Put it into an earthen vessel, and sprinkle upon it four ounces of water, keeping the vessel covered until the lime become hot and fall into powder; then pour on it twelve pounds of water, and mix the lime with the water by agitation. After the lime shall have subsided, repeat the agitation; and let this be done about ten times, the vessel being kept shut, that the free access of the air may be prevented. Finally, let the water be filtered through paper, interposing glass rods between the paper and the funnel, that the water may pass through as quickly as possible. It is to be preserved in very well-stopped bottles."

AQUA CALCIS, Dub. *Lime-water.*

"Take of fresh-burnt lime and boiling water, each *one part.* Put the lime into an earthen vessel, and sprinkle the water upon it, keeping the vessel shut until it become hot and fall into powder; then pour upon it *thirty parts of cold water.* The vessel being again shut, let the mixture be fre-

[1] This metal has the colour and appearance of silver, is solid, four times heavier than water, absorbs oxygen, and burns brilliantly in the open air, and by being oxidised is converted into quick lime. *Phil. Trans.* 1808.

[2] *Phillips's Trans. of Pharm.* p. 71.

quently shaken for twenty-four hours: and then, after the lime has subsided, pour off the limpid fluid, and preserve it in well-stopped bottles."

Syn. Eau de Chaux (*F.*), Kalkwasser (*G.*), Kalkwater (*Dutch*), Aqua di Calce (*I.*).

Of these formulæ, that of the London College is to be preferred; as by keeping the solution upon the lime it is always in a completely saturated state, and the supernatant fluid is generally sufficiently clear to allow it to be decanted off without filtration. It is, however, advisable, in making the solution, first to slake the lime with a small portion of water, before the whole quantity be added; as by this it is prevented from running into a paste, which confines the action of the water. The direction of the Dublin College to use the water for slaking the lime in a boiling state is superfluous. Cold water acts more powerfully on lime than hot water. From Mr. Phillips's experiments, it appears that one pint of water at 212° dissolves 6·7 grains of lime; the same quantity of water at 60° dissolves 11·6 grains; and at 32° the quantity dissolved is increased to 13·25 grains.[1] By heating cold, saturated lime-water, a crystalline deposition of hydrate of lime was thrown down.

Qualities. — Lime-water is inodorous; has a strong, styptic, acrid taste; is limpid and colourless; and changes to green the vegetable blue and red colours. It unites with oil, forming an imperfect soap. When exposed to the air, it attracts carbonic acid, which, combining with part of the lime held in solution, forms on its surface a pellicle of carbonate of lime, which thickens, cracks, and sinks to the bottom of the vessel, leaving its place to be supplied by another pellicle; and thus, by successive formations, the whole of the lime is abstracted from the water. Hence the necessity of preserving the solution in well-closed bottles; and when it is filtered, in small bottles containing such a quantity only as can be used at once. It is decomposed by the acids and sulphur, the alkaline carbonates, phosphates, borates, tartrates, and citrates; the infusions of orange peel, columba, cinchona, rhubarb, and senna, which are consequently incompatible in formulæ with it.

Medical properties and uses. — Lime-water is tonic, antacid, anthelmintic, and externally detergent. It proves very useful in dyspepsia attended with much acidity, by neutralising the acid, and dissolving the sorded mucus with which the stomach is often loaded in this disease; it has also been found efficacious in diarrhœa, diabetes, and leucorrhœa. It destroys intestinal worms, and dissolves the mucus which forms their nidus;

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[1] *Translation of the Pharmacopœia*, p. 72.

and, for the same reason, proves serviceable in slimy bowels. Its internal use, however, should be occasionally suspended for a few days, as its long-continued action on the stomach is apt to prove hurtful. Externally it is applied as a lotion to foul and cancerous ulcers, tinea capitis, and scabies, but with little advantage.

The dose is from f ℥ ij. to O ss., alone or diluted with milk.

Officinal Preparations.—*Oleum Lini cum Calce*, E. D. *Aqua Calcis Composita*, D.

CALCII CHLORIDUM, Lond. *Chloride of Calcium.*

"Take of chalk, *five ounces;* hydrochloric acid, distilled water, each *half a pint.* Mix the acid with the water, and add gradually the chalk to saturation. Then the effervescence being finished, filter: evaporate the fluid until the salt is dried. Put it into a crucible, and having liquefied it in the fire, pour it upon a clean flat stone. Finally, when it is cold, break it into small pieces, and keep it in a well-stopped bottle."

CALCIS MURIAS, Dub. *Muriate of Lime.*

"Take of the liquor which remains after the distillation of the solution of caustic ammonia, *any quantity;* strain the solution, and keep it over the fire in a shallow vessel until the muriate of lime is completely dry. It must be kept in a well-stopped bottle."

This preparation is a chloride of calcium, and consists of chlorine of 64·29 + calcium 35·71, in 100 parts; or 1 eq. of calcium = 20·5 + 1 of chlorine = 35·42, making the equivalent of the salt 55·92.[1]

Qualities.—Chloride of calcium is an inodorous, white, fusible, deliquescent, bitter, pungent salt. It is very soluble in both hot and cold water. It is very soluble also in alcohol. During its solution much cold is produced; and, if snow be used, a freezing mixture, capable of lowering the thermometer from 32° to —50°, is obtained.

Medical properties and uses.—It is sometimes, but rarely, administered in scrofulous affections.

Officinal preparation.—*Liquor Calcii Chloridi*, L. E. D.

LIQUOR CALCII CHLORIDI, Lond. *Solution of Chloride of Calcium.*

"Take of chloride of calcium, *four ounces;* distilled water, *twelve fluid ounces.* Dissolve the chloride of calcium, and filter."

SOLUTIO MURIATIS CALCIS, Edin. *Solution of Muriate of Lime.*

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[1] *Translation of the Pharmacopœia*, p. 74.

"Take of the harder variety of carbonate of lime, (namely, with marble,) broken into small pieces, *nine ounces;* muriatic acid, *sixteen ounces;* water, *eight ounces.* Mix the acid with the water, and gradually add the pieces of carbonate of lime. The effervescence being finished, digest for an hour. Pour off the fluid, and reduce it by evaporation to dryness. Dissolve the residue in its weight and a half of water, and filter the solution."

CALCIS MURIATIS AQUA, Dub. *Water of Muriate of Lime.*

"Take of muriate of lime, *two parts;* distilled water, *seven parts.* Dissolve. The specific gravity of this solution is to that of water as 1202 to 1000."

Syn. Dissolution de Muriate de Chaux (*F.*), Liquore di Muriato di Calce (*I.*). This preparation is now properly named, for even in solution, the salt is a chloride of calcium.

Qualities. — This solution is colourless, and has a disagreeable, bitter, acrid, taste. It is decomposed by the sulphuric, nitric, phosphoric, fluoric, and boracic acids; the neutral salts into which these enter; and the alkaline carbonates, which precipitate the lime in the form of a carbonate.

Medical properties and uses.—Chloride of calcium is deobstruent and tonic. It was introduced into practice by Fourcroy, and has been much recommended as a remedy in scrofulous and glandular diseases. I have given it with evident advantage in bronchocele; and have witnessed more benefit result from its continued use in the varied forms of scrofula, than from any other remedy. Its operation is similar to that of chloride of barium; but the danger of an over-dose is less to be dreaded, and its good effects are more uniform and certain. The dose of the solution is from ♏xx. to f ʒj., increased gradually to f ʒ iv., in a sufficient quantity of water or milk, repeated twice or thrice a day.

Officinal preparations. — *Calcis Carbonas Præcipitatum,* D.

CRETA PREPARATA, Lond. *Prepared Chalk.*

"Take of chalk, *a pound;* water, *as much as may be sufficient.* Add a little water to the chalk, and triturate it to a fine powder. Throw this into a large vessel with the remainder of the water, then stir it, and after a short interval pour off the supernatant turbid water into another vessel, and set it apart that the powder may subside; lastly, let the water be poured off, and dry the powder, and preserve it for use."

In the same manner, shells freed from sordes and washed with boiling water are prepared.

CARBONAS CALCIS PRÆPARATUS, Edin. *Prepared Carbonate of Lime.*

"Let carbonate of lime, triturated to powder in an iron mortar, and levigated with a little water, on a porphyry stone, be put into a large vessel; then pour water upon it, which, after frequently shaking the vessel, is to be poured off, loaded with the fine powder. The subtle powder, which subsides when the water remains at rest, is to be dried. Let the coarse powder which the water could not suspend be again levigated, and treated in the same manner."

CRETA PREPARATA, Dub. *Prepared Chalk.*

"Let it be triturated to powder in an earthen mortar, with the addition of a little water; then mix this with a sufficiently large quantity of water by agitation, and after a short interval, when the coarser particles have subsided, pour off the fluid. This may be frequently repeated, always previously triturating; and, finally, collect the very fine powder, which after some time will subside, and dry it upon an absorbent stone, or paper."

Syn. Craie préparé (*F.*), Rein Kreide (*G.*), Carbonato di Calce preparato (*I.*).

By the suspension of the finer particles of the levigated chalk in water, they are reduced to a more impalpable form, and are more effectually separated from the coarser particles than could be accomplished by any other mechanical means; but the chalk is not freed from the foreign earths it generally contains (see *Calx*, Part ii.), although it be sufficiently pure for medicinal use.

Qualities.—Pure carbonate of lime, in the form of chalk, is a white, opaque, soft, light substance. It is a compound of 43 parts of carbonic acid + 56·5 of lime + ·5 of water in 100 parts.

Medical properties and uses. — Chalk is antacid and absorbent. It is exhibited advantageously in acidities of the primæ viæ; and in diarrhœas, after all irritating matters have been removed from the bowels by previous evacuation (see *Mistura Cretæ*). As an external application, it is sprinkled over ulcers discharging a thin ichorous matter, which is thus absorbed by the chalk, and prevented from excoriating the neighbouring sound skin. In cases of burns it is applied in a similar manner, and a poultice laid over it, by which the skinning of the sore is much hastened.[1]

The dose of chalk is from grs. x. to ℈ ij., or more.

Officinal preparations. — *Mistura Cretæ*, L. E. *Hydrargyrum cum Creta*, L. *Pulvis opiatus*, E. *Trochisci Carbonatis Calcis*, E. *Confectio aromatica*, L. E. *Calcii Chloridum*, L. *Ammoniæ Sesquicarbonas*, L.

CALCIS CARBONAS PRÆCIPITATUM, Dub. *Precipitated Carbonate of Lime.*

"Take of solution of muriate of lime, *five parts.* Add to

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[1] *Kentish on Burns*, passim.

it as much (*sub*) carbonate of soda, dissolved in three times its weight of distilled water, as may be sufficient to precipitate the chalk. Wash the precipitate three times in a sufficient quantity of water; then collect it, and dry it on a chalk-stone, or on bibulous paper."

A double exchange takes place in this process; the chlorine separates from the lime and unites with the sodium of the carbonate of soda, while the carbonic acid combines with the lime: the chloride of sodium thus formed remains dissolved in the water, but the carbonate of lime is precipitated in the form of a white powder. It is an expensive preparation, and the benefit to be derived from a great degree of purity in this substance is not very obvious.

Officinal preparations. — *Hydrargyrum cum Creta,* D. *Electuarium aromaticum,* D. *Mistura Cretæ,* D.

CALX CHLORINATA, Lond. *Chlorinated Lime.*

"Take of hydrate of lime, *a pound;* chlorine, *as much as may be sufficient:* pass the chlorine through the lime, spread in a proper vessel, until it is saturated."

"Chlorine is readily evolved from hydrochloric acid by binoxide of manganese aided by heat."

This is the common bleaching powder of commerce. The opinions of chymists vary with respect to its real nature: some, as Berzelius, consider it a chlorite; others, as Balard, a hypochlorite; Turner and many others, as a chloride; and lastly, a few, namely Dalton, Thomson, and Witter, as a dichloride of lime. The quantity of chlorine absorbed by the hydrate of lime varies according to the degree of pressure, and the quantity of water present in the hydrate.

Qualities.—When pure, chlorinated lime is white; but it is seldom sufficiently pure, and usually has a brownish tint: its odour is that of chlorine, and it impresses an acrid taste on the palate. It is only partially soluble in water; and, when it is exposed to the air, either in the dry or the moist state, it evolves chlorine, and carbonate of lime is formed. It is decomposed by the strong acids and the alkaline carbonates. It is regarded as a compound of 1 eq. of lime = 28·5 + 1 of chlorine = 35·42, making the equiv. 63·92. ($\dot{C}a.\ Cl.$)

Medical properties and uses. — It is employed merely as a disinfecting agent. The chlorine which is evolved unites with hydrogen of the sulphuretted hydrogen always present in such cases; hydrochloric acid is formed, and sulphur precipitated. When mixed with water, the chloride of lime dissolves, and, as the lime absorbs carbonic acid from the air, the chlorine is evolved.

CALCIS PHOSPHAS PRÆCIPITATUM, Dub. *Precipitated Phosphate of Lime.*

"Take of burnt bones rubbed into powder, *one part;* diluted muriatic acid, water, of each *two parts.* Let them be digested together for twelve hours, and strain the solution: add to it as much solution of caustic ammonia as will throw down the phosphate of lime. Wash the precipitate with much water, and finally dry it."

We are not acquainted with the use of this preparation.

PRÆPARATA E CUPRO.

PREPARATIONS OF COPPER.

CUPRI SUBACETAS PRÆPARATUM, Dub. *Prepared Subacetate of Copper.*

"Let the subacetate of copper be reduced to powder, and the more subtle parts be separated in the manner directed for the preparation of chalk."

Syn. Vert-de-gris (*F.*), Grünspan (*G.*), Acetato di Rame (*I.*), Cardenillo (*S.*).

By this process the subacetate of copper is obtained in a state of very minute mechanical division, better fitted for internal use, in the cases for which it is sometimes prescribed. (See *Ærugo*, Part II.)

CUPRI AMMONIO-SULPHAS, Lond. *Ammonio-Sulphate of Copper.*

"Take of sulphate of copper, *an ounce;* sesquicarbonate of ammonia, *an ounce and a half.* Rub them together until the effervescence cease, then wrap up the ammonio-sulphate of copper in bibulous paper, and dry it in the air."

AMMONIURETUM CUPRI, Edin. *Ammoniuret of Copper.*

"Take of pure sulphate of copper, *two parts;* subcarbonate of ammonia, *three parts.* Rub them thoroughly together in a glass mortar until all effervescence is finished, and they unite in a violet-coloured mass, which wrap up in bibulous paper and dry, first on a chalk stone and afterwards with a gentle heat. Let it be preserved in a well-stopped glass phial."

CUPRUM AMMONIATUM, Dub. *Ammoniated Copper.*

"Take of sulphate of copper, *two parts;* carbonate of ammonia, *three parts.* Rub them in an earthenware mortar, until, all effervescence having ceased, they unite into a mass, which is to be dried, wrapped up in bibulous paper, and preserved in a phial closed with a glass stopper."

Syn. Sulphate de Cuivre et d'Ammoniaque (*F.*), Schwefelsaures Kupfer mit Ammonium Kuppersalmiak (*G.*), Ammoniuro di Rame (*I.*).

During the trituration, in these processes, the sulphate of copper is partially decomposed, and part of its acid yielded up to the ammonia, which is consequently freed from the carbonic acid; a carbonate of copper is also formed, which in combination with the sulphate of ammonia, and the undecomposed sesquicarbonate of ammonia, form the ammonio-sulphate of copper. The action of the affinities which produce these changes is, perhaps, aided by the water of crystallisation of the ingredients becoming fluid. In drying the product, it must be very carefully excluded from the air.

Qualities. — This preparation has the odour of ammonia, a hot, styptic, metalline taste, and a rich azure blue colour. By exposure to the air, it parts gradually with ammonia, the blue colour is lost, and the salt acquires a greenish hue. It consists of 1 eq. of disulphate of copper = 79·2 + 2 of ammonia = 34·30 + 1 of water = 9; making the equivalent 122·50.

Medical properties and uses. — This salt of copper is tonic and antispasmodic. It has been principally employed in epilepsy, as a remedy for which it was first proposed by Dr. Cullen; and has since his time been frequently employed with evident advantage, — although we must confess that in our trials of it the event has not been such as to encourage us to place much dependence on its powers for relieving this severe disease. It has also been given in chorea after a course of purgatives. It is less apt to excite nausea than the other preparations of copper. Cullen, however, recommends its use not to be continued for more than a month at a time; and adds, that after the first interval, if the disease continue, the most benefit will be derived from giving the medicine "only for some days before an expected accession."[1] It has been given with advantage in chorea, after a course of purgatives, combined with digitalis and myrrh.

The dose is one fourth of a grain gradually increased to grs. v. given twice a day, either simply made into pill with crumb of bread, or combined with valerian.

LIQUOR CUPRI AMMONIO-SULPHATIS, Lond. *Solution of Ammonio-sulphate of Copper.*

"Take of ammonio-sulphate of copper, *a drachm;* distilled water, *a pint.* Dissolve the ammonio-sulphate of copper in the water, and filter."

CUPRI AMMONIATI AQUA, Dub. *Water of Ammoniated Copper.*

"Take of ammoniated copper, *one part;* distilled water, *one hundred parts.* Dissolve the ammoniated copper in the water, and filter through paper."

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[1] *Mat. Med.* ii. 25.

Too much water is ordered in both these formulæ; it being a curious fact, that this salt is more soluble in a smaller quantity of water, owing to the larger quantity decomposing the salt of copper, and leaving an insoluble oxide of copper, which is precipitated.

Medical properties and uses. — This solution is detergent, and mildly escharotic. It forms an useful local stimulant for cleaning foul, indolent ulcers, and disposing them to heal; and is also employed, still more largely diluted, for removing specks from the cornea.

SOLUTIO SULPHATIS CUPRI COMPOSITA, Edin. *Compound Solution of Sulphate of Copper.*

"Take of sulphate of copper, sulphate of alumina, each *three ounces;* water, *two pounds;* sulphuric acid, *one ounce and a half.* Boil the sulphates in the water, to dissolve them; and then to the liquor filtered through paper add the acid."

This preparation is a simple solution of the sulphates. It is sometimes used as a styptic for stopping hæmorrhages; and largely diluted, as a lotion in ophthalmia tarsi, and the purulent ophthalmia of infants.

PRÆPARATA E FERRO.

PREPARATIONS OF IRON.

FERRI AMMONIO-CHLORIDUM, Lond. *Ammonio-Chloride of Iron.*[1]

"Take of sesquioxide of iron, *three ounces;* hydrochloric acid, *half a pint;* hydrochlorate of ammonia, *two pounds and a half;* distilled water, *three pints.* Pour the hydrochloric acid upon the sesquioxide of iron, and digest in a sand bath for two hours: afterwards add the hydrochlorate of ammonia dissolved in distilled water; strain and evaporate all the fluid; finally, reduce what remains to powder."

MURIAS AMMONIÆ ET FERRI, Edin. *Muriate of Ammonia and of Iron.*

"Take of red oxide of iron washed and again dried, muriate of ammonia, each, *equal parts by weight.* Mix them well together; and sublime by a quick fire. Reduce the sublimed salt to powder, and preserve it in a well-stopped phial."

In the process of the Edinburgh College, the theory of the operation is obvious: the sudden application of an intense

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[1] Ferrum ammoniacale, P. L. 1787, Flores Martiales, Ens Martis, Flores auri, Calendulæ minerales.

heat enables the oxide of iron to decompose the hydrochlorate of ammonia and to unite with part of its acid, and at the same time it probably enters into that degree of combination with the ammonia, which exists in triple salts; the product being either a chloride of iron and ammonia, or a mixed mass of hydrochlorate of ammonia and chloride of iron. In the process of the London College, the sesquioxide of iron is dissolved in the acid; thence the formation of a sesquichloride of iron, which is mixed with hydrochlorate of ammonia.

Qualities. — Ammonio-chloride of iron is not a definite compound, but a mixture consisting of 15 per cent. of sesquichloride of iron + 85 of hydrochlorate of ammonia. It has an odour, resembling, in some degree, that of saffron, and a styptic taste. It is in crystalline grains of an orange-yellow colour; soluble in two parts of water, and also in alcohol; and deliquescent, on which account, it requires to be preserved in very well-stopped phials.

Medical properties and uses. — This preparation of iron is tonic, emmenagogue, and aperient. It was formerly much used in epilepsy, hysteria, chlorosis, scrofula, rickets, chronic rheumatism, and gout; but on account of the uncertainty of the preparation it is now seldom prescribed. The dose is from grs. v. to grs. xx. given twice or thrice a day.

Officinal preparation. — *Tinctura Ferri Ammonio-chloridi*, L.

TINCTURA FERRI AMMONIO-CHLORIDI, Lond.
Tincture of Ammonio-chloride of Iron.[1]

"Take of ammonio-chloride of iron, *four ounces;* proof spirit, *a pint.* Digest and filter."

This being merely a spirituous solution of ammonio-chloride of iron, it seems to be unnecessarily introduced into the Pharmacopœia by the London College.

TINCTURA FERRI SESQUICHLORIDI, Lond.
Tincture of Sesquichloride of Iron.

"Take of sesquioxide of iron, *six ounces;* hydrochloric acid, *a pint;* rectified spirit, *three pints.* Pour the acid over the sesquioxide of iron, in a glass vessel, and digest for three days, shaking them occasionally. Then add the spirit, and strain."

Edinburgh.

"Take of black oxide of iron, purified and reduced to powder, *three ounces;* muriatic acid, about *ten ounces,* or as much as may be sufficient to dissolve the powder. Digest with a gentle heat, and the powder being dissolved, add as

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[1] Tinctura Ferri Ammoniati, P. L. 1829.

much alcohol as will make the whole liquor amount to two pounds and a half."

MURIATIS FERRI LIQUOR, Dub. *Solution of Muriate of Iron.*

"Take of rust of iron, *one part;* muriatic acid, rectified spirits of wine, of each *six parts.* Put the rust into a glass vessel, pour on the acid, and agitate it occasionally for three days; then set it aside, that the fæces may subside, and pour off the liquor: evaporate this slowly to *one pint,* and when it is cold, add the spirit."

Syn. Koch salzaure Eissentinktur (*G.*), Tinctura di muriato di Ferro (*I.*).

Of the formulæ given for the preparation of this tincture, that of the London Pharmacopœia is to be preferred. The metal, as ordered in it, is in a state of oxidizement, which admits of ready decomposition; water and chloride of iron are formed, the latter of which is a compound soluble in alcohol: whereas, by following the Edinburgh and Dublin processes, the solution is a mixture, the black oxide not being all completely oxidized[2]; and it is not till after the exposure to air, and by attracting oxygen, that it is brought into such a state as favours the decomposition requisite for forming the chloride. Hence the Edinburgh and Dublin preparations cannot be always of a uniform and fixed strength, which, for an active medicine, is a matter of much importance. When it is properly prepared according to the London formula, the chloride is a compound of 2 eq. of iron $=56+3$ of chlorine $=106{\cdot}26$, making the equiv. $=162{\cdot}26$. ($Fe.^2$ $Cl.^3$)

Qualities. — The alcoholic solution of chloride of iron is of a brownish-yellow colour, has a peculiar æthereal odour, and an acid, very styptic taste. The sp. gr. is 0·99, and a fluid ounce contains 30 grains of sesquioxide of iron. With the alkalies and their carbonates it gives a red precipitate. It is also precipitated by lime-water, carbonates of lime and magnesia; strikes a black colour with infusions of astringent vegetables, and forms with mucilage of acacia gum an orange-coloured jelly. Hence these substances cannot enter into compositions with this tincture.

Medical properties and uses. — This is an active and elegant preparation of iron, well adapted for all the diseases in which chalybeates prove serviceable. I have found it more useful than any other tonic in scrofula: when it is given in doses, gradually increased, until one hundred and twenty drops be taken for a dose, twice a day. It is, also, in my opinion, the

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[2] When iron filings are dissolved in hydrochloric acid, and completely excluded from the air, a chloride is formed insoluble in spirit of wine. *Davy's Researches,* p. 180.

best chalybeate in dyspepsia. It is also recommended in dysury depending on spasmodic stricture of the urethra, in which case it is given in doses of five or six drops, repeated every ten or fifteen minutes, until nausea be induced. It is used externally as a styptic in cancerous and loose fungous sores. The usual dose is from ♏x. to ♏xxx. in a glass of water, but it may be gradually increased to ♏cxx.

ACETAS FERRI, Dub. *Acetate of Iron.*

"Take of carbonate of iron, *one part;* acetic acid, *six parts.* Digest for three days and filter."

Syn. Acétate de Fer (*F.*). Acetâto di Ferro (*I.*).

This preparation is a mild and efficacious chalybeate: but if the variety of forms in which iron is ordered to be prepared for medicinal purposes be considered, it will obviously appear to be superfluous.

TINCTURA ACETATIS FERRI, Dub. *Tincture of Acetate of Iron.*

"Take of acetate of potassa, *two parts;* sulphate of iron, *one part;* rectified spirits of wine, *twenty-six parts.* Rub together the acetate of potassa and the sulphate of iron in a stone-ware mortar, until they unite into a soft mass; dry this with a moderate heat, and triturate it with the spirit; then put the mixture into a phial, cork it closely, and digest for *seven days,* frequently shaking it: finally, pour the clear tincture from off the fæces."

TINCTURA ACETATIS FERRI CUM ALCOHOLE, Dub. *Tincture of Acetate of Iron with Alcohol.*

"Take of sulphate of iron, acetate of potassa, each *an ounce;* alcohol, *two pints.* Rub together the acetate of potassa and the sulphate of iron in a stone-ware mortar, until they unite into a soft mass: then dry this with a moderate heat, and when it is cold, triturate it with the alcohol. Put the mixture into a phial, cork it closely, and digest for *twenty-four hours,* frequently shaking it: finally, pour the clear tincture from off the fæces."

Syn. Teinture de l'acétate de Fer (*F.*), Tinturo di Marte astringente (*I.*).

These two preparations differ in scarcely any thing except in strength; the theory of the formation of the acetate of iron being the same in both cases. During the process a double decomposition takes place; the sulphuric acid of the sulphate of iron leaves the iron and unites with the potassa of the acetate of potassa, while the disengaged acetic acid of the latter salt combines with the oxide of iron, forming acetate of iron, which is soluble in the alcohol. It is also probable that the oxide of iron absorbs oxygen during the trituration; and being thus more completely oxidized, the mass must contain, instead of an acetate, a binacetate of iron, which is more readily dissolved in the alcohol. The sulphate of potassa remains undissolved in both processes, with a small portion of uncombined oxide of iron, in the form of a brownish precipitate.

Qualities.—These preparations have a peculiar odour, and a warm, styptic taste. They are decomposed by the alkalies and their carbonates, and the strong acids, and by infusions of astringent vegetables, which are, therefore, incompatible in formulæ with them.

Medical properties and uses. — The spirituous solutions of acetate of iron possess the same properties as the other preparations of this metal; but if the introduction of the simple acetate be superfluous, the double form of its spirituous solution is still more objectionable. Indeed, every advantage that can be expected from any of these forms of the acetate can be equally obtained from the potassio-tartrate of iron. And we cannot conceive that any particular benefit can result to practice from loading the list of remedies with all the multifarious combinations of which the same substance is susceptible. The dose of either of the tinctures may be from ♏ x. to f ʒ j. given in a sufficient quantity of water, or any other proper vehicle.

FERRI IODIDUM, Lond. *Iodide of Iron.*

"Take of iodine, *six ounces;* iron filings, *two ounces;* distilled water, *four pints and a half.* Mix the iodine with four pints of the water, and add the iron. Heat in a sand bath; and when the mixture has acquired a greenish colour, decant the fluid. Wash what remains with the half pint of water, boiling. Let the mixed and strained solutions evaporate at a heat not exceeding 212°, in an iron vessel, that the salt may be dried. Keep it in a well-stopped vessel, access of light being prevented."

In this process the union of the iron and iodine is direct; and these two nearly insoluble substances form a most soluble compound. I have found the soft iron wire used for stringing pianofortes preferable to the filings; and as the iodine combines with a definite quantity, the operator need not be particular in the quantity, if the combination be aided by boiling. The evaporation of the solution may be conducted in a common Florence flask, which, as soon as the evaporation is completed, should be rapidly cooled by pouring cold water on it, broken to pieces, and the preparation instantly bottled and well corked. It is, however, preferable to preserve it in solution of the strength of three grains to the drachm; and it can always be maintained of the same strength, by keeping, in the bottle, a coil of soft iron wire.

Qualities. — Solid iodide of iron, when well prepared, may be obtained in masses of beautiful acicular crystals of an iron-grey colour, and faint metallic lustre; but its usual form is an opaque, crystalline mass, closely resembling crystallised masses of iron in appearance. It is extremely deliquescent; and as it becomes moist the iron is oxidized, separates from the iodine, and a sesquioxide is deposited. This is also the case when the solution is exposed to the air; but the iodine set free acts upon the soft iron, and the iodide is again formed, so that the solution is always of the same strength, although a quantity of sesquioxide may accumulate in the bottle.

This preparation is a protiodide consisting of one eq. of iodine = 126·3 + 1 of iron = 28, making the equiv. = 154·3, or, in its crystallised state = 199·3, owing to the addition of five eq. of water: or 100 parts consist of 63·3 of iodine, 14 of iron, and 22·7 of water.[1]

The solution is decomposed by the strong acids, chlorine, the alkalies, ammonia, and their carbonates, by lime-water, chloride of calcium, bichloride of mercury, acetate of lead, and all astringent vegetable infusions and decoctions.

Medical properties and uses.—The extreme solubility of this compound, formed of two very active but little soluble bases, led me to introduce it to the notice of British practitioners, as a powerful therapeutic agent.[2] It is rapidly carried into the circulation, and may be detected in the urine and other secretions, by testing them with chlorine and starch a short time after the iodide has been taken. It operates as a stimulant to the glandular system, whilst at the same time the iron supports and improves the tone of the habit. I have found it beneficial in scrofula in all its forms, chlorosis, atonic amenorrhœa, hysteria, secondary syphilis, and incipient cancer. In secondary syphilis, it may be combined with iodide of potassium; and in incipient cancer its efficacy is aided by the administration of iodide of arsenic at the same time. I have found it serviceable in atonic gastric dyspepsia, when combined with bicarbonate of potassa, and taken at the moment of admixture. The dose is from grs. iij. to grs. viij. or more.

FERRI POTASSIO-TARTRAS, Lond. *Potassio-tartrate of Iron.*

"Take of sesquioxide of iron, *twelve ounces and a half;* solution of sesquicarbonate of ammonia, *a pint*, or *a sufficient quantity;* bitartrate of potassa, *three ounces;* hydrochloric

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[1] *Phillips's Trans. of Pharm.* 1837.
[2] See *Essay on the Iodide of Iron.*

acid, *half a pint;* solution of potassa, *four pints and a half,* or *a sufficient quantity;* distilled water, *three gallons.* Mix the sesquioxide with the acid, and digest in a sand bath for three hours: then add two gallons of the water; and after it has stood for an hour, pour off the supernatant fluid. Wash the precipitate, after having added the solution of potassa, with water frequently poured on it; and while it is yet moist, boil it down with the bitartrate of potassa, previously mixed with a gallon of the water If the solution when tested with litmus proves to be acid, drop into it solution of sesquicarbonate of ammonia to saturation. Lastly, filter, and evaporate the solution by a gentle heat, that the salt may be dried."

TARTRAS POTASSÆ ET FERRI, Edin. *Tartrate of Potassa and of Iron.*

"Take of purified filings of iron, *one part;* supertartrate of potassa, powdered, *two parts;* water, *one part.* Rub them together and expose them to the air in a shallow earthen vessel for fifteen days, stirring the mass daily with a spatula, and keeping it moist by frequent additions of water. Then boil the whole for a short time in four times its weight of water, and pour off the solution from the other fæces. Evaporate the solution to dryness in a water bath, and having rubbed the mass into powder, preserve it in a well-stopped bottle."

TARTARUM FERRI, Dub. *Tartar of Iron.*

"Take of iron wire, *one part;* thin bitartrate of potassa, in very fine powder, *four parts;* distilled water, *eight parts;* or as *much as may be requisite.* Let them be put into a flat vessel, and exposed to the air for fifteen days; stirring the mixture, and adding some water daily, so as to keep the iron humid; but not so much as to cover it. Finally, boil it in a sufficient quantity of distilled water, and evaporate the filtered solution to dryness in a water bath. The tartrate of iron must be kept in a well-stopped bottle."

Syn. Tartrate de Fer et de Potasse (*F.*), Eissenweinstein (*G.*), Tartrato di Potassa e di Ossido di Ferro (*I.*).

In the London process, the sesquioxide of iron and the hydrochloric acid are both decomposed, and a sesquichloride of iron and water is produced: the former is decomposed when the solution of potassa is added, and hydrated sesquioxide of iron precipitated whilst chloride of potassium remains in solution. This hydrated oxide thus formed unites with the superabundant acid of the bitartrate of potassa with which it is boiled, and a solution of sesquitartrate of iron and tartrate of potassa obtained: hence the dried mass consists of tartrate of potassa and of iron. In the Dublin process the superabundant acid of the bitartrate of potassa dissolves as much of the oxide of iron as it can take up; and a clear solution is obtained, which by evaporation yields also a true tartrate of potassa and of iron. As it is almost impossible to procure this salt in crystals, the solution may be evaporated to dryness.

Qualities. — Potassio-tartrate of iron is inodorous, has a slightly styptic taste, and is of a brownish-green colour. It is very soluble in water; and deliquesces, in some degree, when exposed to the air, so as to require to be kept in closely stopped phials. The cold solution of the alkalies and their carbonates do not decompose this salt; but it is instantly decomposed when boiled with any one of them, although ammonia and its carbonate in neither state affect it. The strong acids, lime-water, hydrosulphuret of potassa, and infusions of astringent vegetables decompose it, and are, therefore, incompatible in formulæ with it. It is composed of 1 eq. of tartrate of potassa = 113·63 + 1 eq. of tartrate of the sesquioxide of iron = 106·48, making the equivalent = 220·11.

Medical properties and uses. — This salt possesses the same medicinal powers as the other preparations of iron; but from its mildness, slight taste, and ready solubility, it is a more convenient form for the administration of iron to children; and in many cases in which the other saline preparations of it prove nauseating, and sit uneasy on the stomach. It is advantageously given in all the cases in which chalybeates prove useful; and is also extolled as a remedy in dropsy, in which it is supposed to exert both a diuretic and a tonic power. The dose is from grs. x. to ʒ ss. given either in a state of solution, or in the form of powder or pill combined with an aromatic or a bitter, such as the extract of gentian.

FERRI SESQUIOXYDUM, Lond. *Sesquioxide of Iron.*[1]

"Take of sulphate of iron, *four pounds;* carbonate of soda, *four pounds two ounces;* boiling water, *six gallons.* Dissolve separately the sulphate of iron and the carbonate of soda in three gallons of the water; then mix together the solutions, and set the mixture aside, that the powder may subside; then pour off the supernatant fluid; wash the precipitate in water, and dry it.

CARBONAS FERRI PRÆCIPITATUS, Edin. *Precipitated Carbonate of Iron.* CARBONAS FERRI, Dub. *Carbonate of Iron.*

"Take of sulphate of iron, *four ounces* (*twenty-five parts,* Dub.); subcarbonate of soda, *five ounces* (*twenty-six parts,*

[1] Chalybs præparatus è aceto, et sine aceto, P. L. 1720. Chalybis rubigo præparata, P. L. 1745. Ferri rubigo, P. L. 1787. Ferri subcarbonas, P. L. 1829.

Dub.); water, *ten pounds* (*eight parts*, Dub.). Dissolve the sulphate in the water; then add the subcarbonate previously dissolved in the water, and mix them together. Let the carbonate of iron, which is precipitated, be washed with tepid water, and afterwards dried."

SUBCARBONAS FERRI PRÆPARATUS, Edin. *Prepared Subcarbonate of Iron.*

"Let purified filings of iron be frequently moistened with water, till they fall into rust, which is to be rubbed to powder."

FERRI RUBIGO, Dub. *Rust of Iron.*

"Take of iron-wire, *any quantity.* Cut it into small pieces, which are to be exposed to the air and frequently moistened with water, until they be converted into rust; let this be rubbed in an iron mortar, and by pouring water on it, wash over the finest part of the powder, which is to be dried."

Syn. Carbonate de Fer (*F.*), Kohlensaures eisin Rost (*G.*), Ossido Carbonato di Ferro (*I.*), Sudud ul hedeed (*Arab.*), Eerumboo Lohayka zung (*Duk.*), Mandura (*Sans.*), Kith (*Hind.*), Zafran ahun (*Pers.*), Tuppoo (*Tam.*).

This preparation was originally intended to be a protocarbonate of iron; but even when the sulphate employed is a protosulphate, it contains more sesquioxide of iron than protocarbonate: thence its present name. By mixing the solutions together, a double decomposition is effected; the sulphuric acid of the sulphate of iron combines with the soda, while the iron attracts the disengaged carbonic acid of the carbonate of soda; and thence the products are an insoluble protocarbonate of iron, and a soluble sulphate of soda, which are easily separated by washing and filtration. When first precipitated, the protocarbonate of iron has a whitish colour, and is at a minimum of oxidizement; but while drying, it attracts oxygen rapidly from the atmosphere, parts with the carbonic acid, and is converted into the sesquioxide. I have found that the precipitate combines with the largest proportion of carbonic acid when the solutions are mixed at a temperature of 150° of Fahrenheit. Filtration is necessary for separating it, the decantation of the clear fluid being very difficult, owing to the lightness of the precipitate. The great solubility of the sulphate of soda renders much subsequent washing unnecessary; and the precipitate, after being washed in distilled tepid water, should be dried in the paper on which it is filtered, by a heat not exceeding 200°.

Qualities.—Precipitated sesquioxide of iron is inodorous, has a slightly styptic taste, and is of a chocolate-brown colour. It is insoluble in water, but acids dissolve it with slight effervescence, disengaging the small portion of carbonic acid which it contains in the gaseous form. It is decomposed by heat, and converted into the peroxide of the metal. In my experiments, ten grains of the dried sesquioxide, prepared with protosulphate of iron, and effloresced carbonate of soda, lost 2·3 grains when dissolved in hydrochloric acid; and the same quantity prepared with the crystallised alkali, and dried with great care, lost 1·4; so that, prepared in the former method it contained 23 per cent. of carbonic acid, and in the latter 14 per cent. Mr. Phillips says, he has found that it contains 15 per cent. when prepared with the greatest care, which indicates its composition to be carbonate of iron 40, sesquioxide of iron 60, in 100 parts[1]; but it rarely contains so much of the carbonate. The composition of the carbonate is 1 eq. protoxide of iron $=36+1$ of carbonic acid $=22·12$, making the equivalent 58·12; that of the sesquioxide is 2 eq. of iron $=56+3$ of oxygen $=24$, making the equivalent $=80$.

Medical properties and uses.—This preparation is a useful tonic: it has been prescribed with great advantage in tic douloureux, chorea, and other affections of the nervous system. Its medical powers have been ascribed to the carbonate of iron which it contains. One great objection to its use is the large dose required in tic douloureux; on which account I generally administer the carbonate of iron the moment it is formed, by decomposing grs. vi. of the sulphate, in solution, with a scruple of bicarbonate of soda. The dose is from grs. iv. to grs. xxx. given three times a day, combined with myrrh, or aromatics. But in tic douloureux it is given to the extent of four drachms or more for a dose.

Officinal preparations. — *Tartarum Ferri*, D. *Tinctura Ferri Sesqui-chloridi*, L.

FERRI SULPHAS, Lond. *Sulphate of Iron.*[2]

"Take of iron filings, *eight ounces;* sulphuric acid, *fourteen ounces;* water, *four pints.* Mix the sulphuric acid with the water, and add the iron; then apply heat, and when the effervescence is over, filter the solution, and set it aside, that crystals may form. Evaporate the liquor decanted that it may again yield crystals. Dry them all."

SULPHAS FERRI, Edin. *Sulphate of Iron.*

"Take of iron, sulphuric acid, of each, *by weight, eight ounces;* water, *four pints.* Mix the sulphuric acid with the water in a glass vessel, and add the iron to them; when the effervescence is over filter the solution through paper, and after due evaporation set it apart, that crystals may form. Having poured off the liquor, dry these upon bibulous paper."

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[1] *Trans. of the Pharm.* p. 98. 1829.

[2] Old names of this salt: — *misy, sory, calchantum* (Pliny), *sal martis, sal chalybis, vitriolum ferri, vitriolum martis.*

FERRI SULPHAS, Dub. *Sulphate of Iron.*

"Take of iron wire, *four parts;* sulphuric acid, *seven parts,* water, *sixty parts.* Digest the mixture, that the metal may be dissolved, after which filter the solution through paper; finally, after due evaporation, set it apart, that crystals may form by slow cooling."

Syn. Sulfate de Fer (*F.*), Schwefelsäures Eisen (*G.*), Zwalvelzuures yzer (*Dutch*), Gron Vitriol (*Danish*), Solfato di Ferro (*I.*), Vitriola verde (*S.*), Caparosa verde (*Port.*), Unua Baydie (*Tam.*), Casis (*Hind.*), Heera Cashsih (*Duk.*), Taroosce (*Malay*), Zungarmadenee (*Arab.*), Tootya Subz (*Pers.*).

In these processes part of the water is decomposed; the iron is oxidized by combining with its oxygen, while its hydrogen is dissipated in the gaseous form; and the oxide thus produced unites with the acid, and forms sulphate of iron, or rather sulphate of oxide of iron; which is dissolved in the undecomposed portion of the water. Concentrated sulphuric acid, nevertheless, scarcely exerts any action on iron at a low temperature, and water alone is very slowly decomposed by it, so that the rapid decomposition of the diluted acid by the iron must be ascribed to the sum of the affinities of the base of the acid for oxygen, and of the iron for oxygen being superior to that of the oxygen to the hydrogen of the water, which is therefore decomposed. The solution is of a pale-green colour, and, when evaporated directly, yields crystals of protosulphate of iron[1]: but if it be exposed for some time to the atmosphere, it attracts oxygen, becomes turbid, a sulphate of the peroxide is precipitated, and the salt obtained is a persulphate.

Qualities. — Sulphate of iron is inodorous, has a strong styptic taste: it crystallises in transparent, rhomboidal prisms, of a fine pale green colour, which redden the vegetable blues, are soluble in two parts of water at 60°, and three fourths of their weight of boiling water, and are insoluble in alcohol. It is precipitated nearly white from aqueous solutions by the alkalies, and also by ferrocyanate of potassa, but, on exposure to the air, the former becomes red, owing to the formation of the sesquioxide; the latter becomes blue, as a prussian blue. When exposed to the air, the crystals become opaque, and are covered with a yellow powder, owing to the attraction of the oxygen of the atmosphere by the salt, during its efflorescence. Exposed to heat, sulphate of iron undergoes the watery fusion, and loses six sevenths of its water; the crystals lose their form, and fall to

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[1] This salt, which is known in commerce by the name of *green vitriol,* is prepared on a great scale from the native sulphurets of iron, by exposing them to the air and moistening them, till a crust of sulphate of iron is formed on their surface which is afterwards obtained in crystals by solution add evaporation. The Harz yields annually 985 cwt.

powder; and in an increased heat the acid, partly in the state of what is termed *Glacial Oil of Vitriol*, is driven off, and the base remains in the state of a red oxide, the *colcothar of vitriol* of commerce. According to Dr. Thomson[1], 100 parts of the green sulphate consist of 26·7 of sulphuric acid, 28·3 oxide of iron, in the state of protoxide, and 45·0 of water.[2] Mr. Phillips makes the proportions to be of acid 28·8, protoxide of iron 25·9, and water 45·3, or 1 equivalent of acid = 40·1 + 1 of protoxide = 36 + 7 equivalents of water = 63; making the equivalent of the salt 139·1 ($\dot{Fe}\,\dddot{S} + 7\,\dot{H}$). The following substances decompose sulphate of iron: the earths, the alkalies and their carbonates, ammonia, lime-water, biborate of soda, phosphate of soda, hydrochlorate of baryta, nitrate of silver, acetate of lead, every salt the base of which forms an insoluble compound with sulphuric acid, and soaps: thence these are incompatible in formulæ with this salt. It is also decomposed by all infusions of vegetable astringents. It should be preserved in alcohol.

Medical properties and uses. — Sulphate of iron is tonic, emmenagogue, and anthelmintic.[3] It is a useful remedy when exhibited with due caution, in all cases in which preparations of iron are indicated; but in improper doses it occasions pain of the bowels, nausea, and vomiting, and often proves hurtful by being too long taken. It has been given with advantage in diabetes, in the latter stage of phthisis, and in amenorrhœa depending on a weakened action of the blood-vessels. The dose is from gr. j. to v. combined with ammoniacum, rhubarb, myrrh, or bitter extracts, and extracts of conium and of aconite. It has lately been used, dissolved in water, as a lotion to cancerous and phagedenic ulcers.[4]

Officinal preparations. — *Ferri Sesquioxydum*, L. *Tinctura Ferri Muriatis*, D. *Ferri Subcarbonas*, E. *Mistura Ferri Composita*, L. *Pilulæ Ferri Compositæ*, L.

SULPHAS FERRI EXSICCATUS, Edin. *Dried Sulphate of Iron.*

"Take of sulphate of iron, *any quantity*. Let it be heated in an unglazed earthen vessel, on a moderate fire, until it become white and perfectly dry."

In this process the degree of heat should not exceed 212°

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[1] *System of Chymistry*, 4th edit. iii. 225.

[2] Of this quantity of water, 8 parts are water of composition, the oxide being in the state of a *hydrate*.

[3] It was used as an anthelmintic in the time of Pliny, who says, "Sumitur ad depellenda ventris animalia drachmæ pondere cum melle." *Nat. Hist.* lib. xxxiv. cap. 12.

[4] *Edinburgh Med. and Surg. Journal*, ii. 373.

of Fahrenheit. The salt is merely deprived of its water of crystallisation.

Officinal preparation. — *Oxydum Ferri rubrum*, E. D.

LIMATURA FERRI PURIFICATA, Edin. *Purified Filings of Iron.*

"Having placed a sieve over the filings, apply a magnet, so that it may draw the filings upwards through the sieve."

Syn. Limaille de Mars (*F.*), Gepulvertes Eisen (*G.*), Limatura diFerro (*I.*), Eerumboo Podia (*Tam.*).

The iron filings obtained from the workshops are always mixed with many impurities, and often with filings of copper and other metals. It requires some address to purify them by this process: the sieve should not be placed too close upon the filings, but as distant as the sphere of attraction of the magnet will admit of, so that the iron only may be raised.

OXIDUM FERRI NIGRUM PURIFICATUM, Edin. *Purified Black Oxide of Iron.*

"Let the scales of the black oxide of iron, found at the anvil of the blacksmith, be purified by the application of the magnet: for the magnet attracts the thinner and purer scales only leaving the larger and less pure."

FERRI OXYDUM NIGRUM, Dub. *Black Oxide of Iron.*

"Let the scales of iron, found at the blacksmith's anvil, be purified by the application of the magnet. Then reduce them to a powder, the finest parts of which are to be separated in the manner ordered for the preparation of chalk."

Syn. L'oxide noir de Fer (*F.*), Schwarzesges auertes Eisin (*G.*), Ossido nero di Ferro (*I.*).

The scales struck off from red-hot iron by the hammer of the blacksmith are a mixture of protoxide and peroxide, but they still retain their magnetic quality in a sufficient degree to admit of being purified in the above manner.

Qualities. — This is an admixture of two oxides: for in heating a bar of iron, the outer layer contains the peroxide, whilst the inner is solely the protoxide

Medical properties and uses. — This mixed oxide is tonic, deobstruent, and anthelmintic. It is efficaciously administered in general debility, dyspepsia, chlorosis, and worm cases. Its utility is determined by its meeting with acid in the stomach, which is known to be the case by the disagreeable eructations it produces, and the black colour of the alvine evacuations. The dose is from grs. v. to ℈j., combined with any aromatic powder, or formed into an electuary with honey, and taken twice a day.

Officinal preparation. — *Tinctura Ferri Muriatis*, E.

OXYDUM FERRI RUBRUM, Edin. *Red Oxide of Iron.*

"Let dried sulphate of iron be exposed to a violent heat, until it is converted into a red-coloured substance."

FERRI OXYDUM RUBRUM, Dub. *Red Oxide of Iron.*

"Let dried sulphate of iron be exposed to heat until the water of crystallisation be expelled; then let it be roasted in a strong fire as long as any acid vapour is produced. Let the red oxide be washed till the water poured from it does not indicate, by the test of litmus, the presence of any acid; and, lastly, dry it upon bibulous paper."

Syn. Oxyde de Fer rouge (*F.*), Eissenoxyd (*G.*), Perossido rosso di Ferro, (*I.*).

By the degree of heat employed, the sulphuric acid of the sulphate is partly driven off in a highly concentrated state, and partly decomposed; sulphurous acid being disengaged, and the oxide more highly oxidized. The residue is the red peroxide of iron, combined with a portion of the red sulphate, which renders it deliquescent; and which should therefore be separated by washing, as directed by the Dublin College. According to Proust, the red oxide at the highest degree of oxidizement consists of 48 parts of oxygen, and 52 of iron. In equivalents its composition is 1 proportional of iron $= 28$ $+ 1\frac{1}{2}$ of oxygen $= 12$, making the equivalent $= 40$.

Medical properties and uses. — This preparation is possessed of fewer medicinal properties than the other oxides of iron.

Officinal Preparation. — *Murias Ammoniæ et Ferri*, E. D.

TABLE SHOWING HOW MUCH OF EACH PREPARATION OF IRON OF THE LONDON PHARMACOPŒIA CONTAINS ONE GRAIN OF OXIDE.

Ferri Sulphatis	gr. 3·8
Ferri Sesquioxydi	1·2
Ferri Ammonio-chloridi	66·0
Ferri Potassio-tartratis	5·0
Pilulæ Ferri compositæ	20·0
Misturæ Ferri compositæ	f ℥ jss.
Tincturæ Ferri Ammonio-chloridi	f ʒ iij.
Tincturæ Ferri Sesquichloridi	♏ xiv.

PRÆPARATA EX HYDRARGYRO.

PREPARATIONS OF MERCURY.

HYDRARGYRUM CUM CRETA, Lond. *Mercury with Chalk.*[1]

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[1] Mercurius alkalizatus, P. L. 1745.

"Take of mercury, *three ounces;* prepared chalk, *five ounces.* Rub them together until globules are no longer visible."

HYDRARGYRUM CUM CRETA, Dub. *Mercury with Chalk.*

"It is prepared in the same manner as the mercury with magnesia, only instead of carbonate of magnesia employing precipitated chalk."

In these processes the mercury is oxidized during the trituration, and is left in the state of the binoxide. Mr. Phillips says, that he knows from good authority that a little water greatly facilitates the process.

Medical properties and uses.—It is alterative, and is occasionally prescribed in mesenteric affections, in porrigo, and other cutaneous affections. It merits attention as a mild alterative for children. The dose may be from grs. v. to ʒss. given twice a day, mixed in any viscid substance.

HYDRARGYRUM CUM MAGNESIA, Dub. *Mercury with Magnesia.*

"Take of mercury, manna, of each, *two parts;* carbonate of magnesia, *one part.* Triturate the mercury with the manna in an earthen mortar, adding as many drops of water as will give to the mixture the thickness of syrup, and continue the rubbing until the metallic globules completely disappear; then add, still triturating, *one eighth part* of the carbonate of magnesia; and after the whole is well mixed together, add *sixteen parts* of hot water, and agitate the mixture. Allow the mixture to remain for some time at rest, in order that the sediment may subside, from which the fluid is to be decanted. Repeat the washing a second and a third time, that the whole of the manna may be removed; and add the remainder of the magnesia to the sediment while it is still moist. Finally, dry the powder upon bibulous paper."

The addition of the manna in this process, and in the former preparation with chalk of the Dublin College, is intended only to facilitate the oxidizement of the mercury, and therefore, it is afterwards removed by the subsequent washings, so that the product is supposed to remain a grey or black oxide of mercury, mixed with magnesia. It is a preparation which might well be rejected.

HYDRARGYRI OXYDUM, Lond.[1] *Oxide of Mercury.*

"Take of purified mercury (by weight), *three pounds;* nitric acid (by weight) *a pound and a half;* distilled water, *two pints.* Mix them in a glass vessel, and boil until the mercury be dissolved, and a white mass remain after the

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[1] Hydrargyrus nitratus ruber, P. L. 1787.

evaporation of the water. Rub this into powder, and put it into another vessel, very shallow; then expose it to a gentle heat, and gradually raise the fire until it cease to emit red vapours."

OXYDUM HYDRARGYRI RUBRUM PER ACIDUM NITRICUM, Edin. *Red Oxide of Mercury by Nitric Acid.*

"Take of purified mercury, *three parts;* diluted nitrous acid, *four parts.* Dissolve the mercury, and evaporate the solution over a gentle fire to a white, dry mass, which, being rubbed to a powder, is to be put into a glass cucurbit, and covered with a thick plate of glass. Then adapt a capital to the vessel; and, having placed it in a sand bath, let the contained matter be roasted with a fire gradually raised until it pass into small very red scales."

HYDRARGYRI OXYDUM NITRICUM, Dub. *Nitric Oxide of Mercury.*

"Take of purified mercury, *two parts;* diluted nitrous acid, *three parts.* Dissolve the mercury, and let heat be applied until the dried matter be converted into red scales."

Syn. Oxyde Mercure rouge par l' Acide nitrique (*F.*), Röther Präcipitatat (*G.*), Mercurio precipitato rosso (*I.*).

In this process, the mercury is first oxidized at the expense of part of the acid employed; and the oxide, which is in a high state of oxidizement, combines with the undecomposed acid, so as to form a nitrate of mercury. By augmenting the heat, this nitrate is decomposed, and also the acid, whilst the oxide is left of a bright red colour, as a binoxide, combined with a small portion of undecomposed nitrate. However simple the process may appear to be, yet it has been always found difficult to produce the bright red scaly appearance, which the product should have when it is properly prepared. Much of the success depends on the purity of the acid; the proper regulation of the heat, which, at the utmost, should not be 600°[1]; and the scale on which it is formed, the heat being more steadily maintained, and acting with more uniformity, on a large than on a small quantity of materials. On this account, the red precipitate prepared in Holland has always been considered better than any prepared in this country. The proportions used by the Dutch chemists are fifty pounds of pure mercury, and seventy of pure nitrous acid of a specific gravity 1·3. The decomposition is conducted in very large flat vessels, the fire being raised when the gaseous nitrous fumes cease to be sensibly disengaged; and the test of its perfection is the inflammation of a match which has been

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[1] Higgins, *Essays,* i. 133.

just blown out, by introducing it into the vapour arising from the decomposing oxide.[1]

Qualities.—When properly prepared, this is a binoxide mixed with a trace of nitrate of mercury. It is in small scales of a bright red colour, very acrid and corrosive; insoluble in water, but totally soluble in nitric acid without effervescence. It is completely volatilised in a red heat, and at the same time decomposed. We have found the observation of Dr. Murray correct, that "if the preparation be boiled for a short time with five or six times its weight of water, the liquor, when filtered, has the styptic, metallic taste, and gives a white precipitate with water of ammonia or carbonate of potassa; a plain proof that it holds dissolved nitrate of mercury."[2] According to Payssé, 100 parts contain 82 of mercury and 18 of oxygen; but according to Mr. Phillips[3], the proportions are mercury 92·7, oxygen 7·3, or 1 eq. of mercury = 202, and 2 of oxygen $(2 \times 8) = 16$, making the equivalent 218 ($\ddot{Hg}$). It is sometimes adulterated with red oxide of lead, which may be detected by dissolving one part of the suspected oxide in four parts of acetic acid: if the oxide of lead be present, the solution has a sweetish taste; and when the oxide is subjected to the flame of a spirit lamp on a piece of charcoal, a button of lead is procured; whilst in its pure state it is perfectly volatilised.

Medical properties and uses.—Nitric oxide of mercury is stimulant and escharotic. It is an external application only, being used, when rubbed into a fine powder, as a stimulant to old sores, and for destroying fungus. As a powder, in the proportion of gr. ss. to grs. iv. of sugar, it is blown into the eye to remove specks on the cornea; and formed into an ointment with lard, it is a useful application to ulcerations of the eyelids, and to chancres.

Officinal preparation.—*Unguentum Hydrargyri Nitrico-oxidi,* L. E. D.

HYDRARGYRI OXYDUM CINEREUM, Lond.

Grey Oxide of Mercury.

"Take of chloride of mercury, *an ounce;* lime-water, *a gallon.* Mix, and agitate assiduously; set aside, and when the oxide has subsided pour off the fluid; lastly, wash this with distilled water, until nothing alkaline can be perceived, and dry it in the air wrapped in bibulous paper.

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[1] M. Payssé, *Annales de Chimie,* li. 202.

[2] *System of Materia Medica,* ii. 329. Dr. Murray suggests that it should have been named *Subnitras Hydrargyri ruber,* but improperly, as the undecomposed salt which it contains is a *nitrate.*

[3] *Trans. of the Pharm.* p. 110.

OXYDUM HYDRARGYRI CINEREUM, Edin. *Grey Oxide of Mercury.*

"Take of submuriate of mercury, *half an ounce;* lime-water, *five pounds.* Boil the submuriate in the solution, for a quarter of an hour in a slightly covered vessel. Pour off the supernatant fluid, then wash the oxide with distilled water, and dry it."

HYDRARGYRI OXYDUM NIGRUM, Dub. *Black Oxide of Mercury.*

"Take of sublimed calomel, *one part;* hot solution of caustic potassa, *four parts.* Rub them together; the oxide acquires a black colour; then wash it well with water, and dry it, in a moderate heat, on bibulous paper."

Syn. Oxide gris de Mercure (*F.*), Schwarzes gesauertes Quecksilber (*G.*), Protossido cinereo di Mercurio (*I.*).

In the London and Edinburgh processes, the lime-water decomposes the calomel, and is itself also decomposed: its calcium unites with the chlorine of the chloride, whilst its oxygen combines with the mercury, and the insoluble protoxide remains of a greyish colour: the chloride of calcium which is formed, being soluble, is easily separated by washing. In the Dublin process, the alkaline solution yields the oxygen required in the same manner as the lime-water in the London process.

Qualities.—Grey oxide of mercury, properly prepared, is in the form of an impalpable, blackish grey-coloured powder, which becomes paler if exposed to air and light. It is inodorous, insipid, and insoluble in water. In the state in which it is usually found in the shops, it is of a light grey colour, almost approaching to a white: when prepared according to the London formula, it has been supposed [1], that the product is strictly a chloride of mercury mixed with the protoxide; and I have found, from experiment, that this is actually the case. The constituents of the protoxide are 96·2 parts of mercury, and 3·8 of oxygen, in 100 parts, or one eq. of mercury $=202+1$ of oxygen $=8$; making the equivalent 210 ($\dot{Hg}$). It ought to dissolve totally in nitric and acetic acids, and to decompose the hydrochloric, which again changes it into the chloride.

Medical properties and uses.—The grey oxide of mercury, when well prepared, may be used as a substitute for the oxide prepared by trituration; and as it is more likely to be always of an uniform strength, it may of course be more depended on than that preparation. It has been, however, objected to for forming ointment for the purposes of mercurial frictions

[1] *Murray's System of Materia Medica*, ii. 326.

(see *Ung. Oxydi Hydrargyi cinerei*); but perhaps the objections have originated from that form of the preparation having been used which contains the triple salt. We have seen it used with advantage for fumigation, both locally applied to assist the healing of venereal ulcers, and, generally, to bring the habit under the mercurial influence, when the mercury could not be introduced by the ordinary mode. The dose of this oxide is from gr. i. to grs. iij., given in the form of pill twice a day.

Officinal preparation. — *Unguentum Oxydi Hydrargyri cinerei.* E.

HYDRARGYRI BINOXYDUM, Lond.[1] *Binoxide of Mercury.*

"Take of bichloride of mercury, *four ounces;* solution of potassa, *twenty-eight fluid ounces;* distilled water, *six pints.* Dissolve the bichloride in the water, strain, and add the solution of potassa. Wash the powder thrown down in distilled water, until nothing alkaline be perceived, and dry it with a gentle heat."

HYDRARGYRI OXYDUM RUBRUM, Dub. *Oxide of Mercury.*

"Take of purified mercury, *any quantity.* Put it into an open glass vessel with a narrow mouth and a broader bottom, and expose it to a heat of about 600°, until it be converted into red scales."

Syn. Oxide de Mercure rouge par le feu (*F.*), Rothes Quecksilberoxyd (*G.*), Perossido rosso di Mercurio (*I.*).

In the London process both the bichloride and the potassa are decomposed, a chloride of potassium is formed, which remains in solution whilst the oxide is precipitated in the form of a hydrate.

In the Dublin process the mercury is brought nearly to the boiling point[2], so as to be volatilised, in which state it decomposes atmospherical air, attracting its oxygen, and is converted into a red oxide. A small quantity of mercury requires several weeks to be thus oxidised; and, therefore, as much only is introduced into the vessel as can cover its bottom; and both on this account, and in order to prevent the dissipation of the volatilised metal, the shape of the vessel is of some importance. It should have a wide bottom, a long neck, and the extremity extended almost to a point; and it should be heated in a sand bath, the sand not rising higher round the vessel than the mercury stands within it. By

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[1] Hydrargyrus calcinatus, P. L. 1787. Hydrargyri Oxydum Rubrum, P. L. 1824.

[2] Irvine makes the boiling point of mercury to be 672°; Crichton 655°; and Dalton, 660°.

maintaining a steady heat sufficient to produce gentle ebullition, a constant circulation of the mercurial vapour takes place in the upper part of the matrass, and as it combines with oxygen, a dull film first forms on the surface of the mercury, which is next converted into a black powder, and lastly into deep red shining scales. A part of the mercury is always lost; and as the process requires so long a time for its completion, the preparation is necessarily expensive.

Qualities.—*Binoxide of mercury*, by the London process, is obtained in the form of a deep orange yellow powder; but by the Dublin it is in minute, crystalline, very brilliant, sparkling, deep red scales, inodorous, but acrid and caustic. Each is a binoxide, soluble in a small degree in water, forming a solution which greens the infusion of violets: it is also soluble in several of the acids without decomposition. Potassa and soda decompose these solutions, and precipitate the binoxide of an orange colour. Ammonia forms a white precipitate, which is a triple compound of the acid, the binoxide, and ammonia. When rubbed with running mercury, both are changed into black oxide; and when heated to ignition in a glass retort it is decomposed, very pure oxygen being obtained, whilst the metal returns to the state of running mercury. According to Lavoisier, 100 parts of this oxide contain 7 of oxygen: Mr. Phillips makes the proportion 7·3; Fourcroy, 8: and Chenevix, 15 parts. In equivalents it consists of 1 eq. of mercury$=202+2$ eq. of oxygen$=16$; making the equivalent 218 ($\ddot{H}g$). The light partially decomposes the binoxide hence it should be kept in opaque bottles.

Medical properties and uses.—This is a very active preparation of mercury, and has been employed by some very celebrated practitioners[1] as an internal remedy in syphilis. It is, however, very apt to cause vomiting, purging, and otherwise violently to affect the stomach and bowels; consequently it is now scarcely ever exhibited internally, or employed as an antisyphilitic. The dose may be one eighth of a grain to gr. j. combined with gr. ss. of opium, in the form of pill, night and morning. It is chiefly used as an external stimulant and escharotic, in the same cases as the nitric oxide; being previously rubbed to a fine powder, and either sprinkled over the ulcers, or united with lard, and applied as an ointment.

HYDRARGYRI PERSULPHAS, Dub. *Persulphate of Mercury.*

"Take of purified mercury, sulphuric acid, of each *six parts;* nitric acid, *one part.* Let the mixture be exposed to

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[1] John Hunter.

heat in a glass vessel, gradually increasing the heat, until the matter, when nearly dry, acquire a white colour."

In this process the nitric acid is decomposed, its oxygen combines with the mercury, forming it into a binoxide, which in its turn unites with the sulphuric acid, and forms a persulphate. It is white, in fine crystalline plates, or in prismatic needles; is soluble in 500 parts of cold, and 250 of boiling water. It consists of 1 proportion of binoxide of mercury $=216+2$ proportions of sulphuric acid$=80{\cdot}2$; making the equivalent $296{\cdot}2$ ($\ddot{H}g+2\dddot{S}$). Its chief use is for making the bichloride of mercury.

Officinal preparations.—*Hydrargyri Oxydum Sulphuricum, D. Hydrargyri Murias Corrosivum,* D. *Calomelas sublimatum,* D.

ACETAS HYDRARGYRI, Edin. *Acetate of Mercury.*

"Take of purified mercury, *three ounces;* diluted nitrous acid, *four ounces and a half,* or *a little more than may be required for dissolving the mercury;* acetate of potassa, *three ounces;* boiling water, *eight pounds.* Mix the mercury with the acid; and, towards the cessation of the effervescence, digest, if necessary, until the mercury be completely dissolved. Then dissolve the acetate of potassa in the boiling water; and immediately to this solution, still hot, add the former, and mix them together by agitation. Set the mixture aside to crystallise; then wash the crystals placed in a funnel with cold distilled water; and finally dry them with a very gentle heat.

"In preparing acetate of mercury, it is necessary that all the vessels which are used, and the funnel, be of glass."

HYDRARGYRI ACETAS, Dub. *Acetate of Mercury.*

"Take of purified mercury, *nine parts;* diluted nitrous acid, *eleven parts;* acetate of potassa, *nine parts;* boiling distilled water, *a sufficient quantity.* Add the nitric acid to the mercury; and when the effervescence is over, digest, that the metal may be dissolved.

"In the whole of this process glass vessels must be used."

Syn. Acétate de Mercure (*F.*), Essigsaures Quecksilber (*G.*), Acetato di Mercurio (*I.*).

Acetic acid scarcely acts on mercury; but by either of the above processes the acetate may be formed. Nitrate of mercury is first obtained by the action of the nitric acid on the mercury; and this is decomposed by the acetate of potassa, the alkali of which unites with the acid of the metallic salt, and forms nitrate of potassa, which remains in solution; while the disengaged acetic acid combines with the protoxide of mercury, and forms the acetate of mercury, which readily crystallises, and is thus easily separated. By preparing the solution of the nitrate of mercury with a low heat, when there is an excess of acid, the portion of mild acetate of mercury produced is considerable; but if the quantity of acid be sufficient for the saturation only of the oxide, a sudden decomposition of the solution is effected by the hot water which contains the acetate of potassa in solution, independent of the action of the acetate, and a subnitrate of mercury of a yellow colour is precipitated. Hence the propriety of the direction of the Edinburgh College to use more acid "than is required for dissolving the mercury." It is of much importance also that the degree of heat be low; for if a high temperature be employed, the metal is oxidised to a maximum, and the product of the subsequent part of the process is a binacetate, which is very acrid and soluble, instead of the protosalt intended to be produced. For the success of the process, which often fails, the solution of the acetate of potassa should not be used immediately after it is made, but should be scarcely more than tepid when it is mixed with the solution of the nitrate of mercury; and to the water employed for washing the salt should be added about f ʒ j. of distilled vinegar for every Oss. of water; which prevents the partial decomposition of the acetate, and the consequent yellow colour of the crystals, that sometimes occur in the washing.

Qualities.—This salt, when properly prepared, is in small flat crystals of a silvery whiteness, acrid to the taste, soluble in hot water, but scarcely soluble in cold water. It is insoluble in alcohol. The alkalies decompose it, and it is readily decomposed by heat. Light also has this effect, blackening the salt. It consists of 1 eq. of protoxide of mercury $=210+1$ of acetic acid $=51{\cdot}48$, making the equivalent $261{\cdot}48$.

Medical properties and uses.—Acetate of mercury is antisyphilitic and alterative; but it is scarcely ever used, unless as the active ingredient of Keyser's pills. As an external application, a solution of it, in the proportion of grs. ij. in f ℥ ij. of rose-water, is used in some cutaneous affections. The internal dose is gr. j. night and morning.

HYDRARGYRI AMMONIO-CHLORIDUM[1] Lond.
White precipitated Mercury.

"Take of bichloride of mercury, *six ounces;* distilled water, *six pints;* solution of ammonia, *eight fluid ounces.* Dissolve the bichloride mercury in the water, aided by heat: and add to this, when cold, the solution of ammonia, frequently

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[1] Mercurius præcipitatus albus, P. L. 1745. Calyx hygrargyri alba, P. L. 1787. Hydrargyrum præcipitatum album, P. L. 1824.

stirring. Wash the precipitated powder until it become tasteless, and then dry it."

HYDRARGYRI SUBMURIAS AMMONIATUM, Dub. *Ammoniated Submuriate of Mercury.*

" Add to the fluid which has been poured off from the precipitated calomel a quantity of water of caustic ammonia sufficient to precipitate the whole of the metallic salt. Wash the precipitate with cold distilled water, and dry it upon bibulous paper."

Syn. Muriate de Mercure precipité (*F.*), Salsaures Quecksilber prazipitat (*G.*), Precipitato bianco di Mercurio (*I.*).

The products of these two processes are precisely the same. The fluid which the Dublin College orders to be used is that which is decanted from the precipitated chloride of mercury, prepared by heat; and which holds the bichloride in solution: so that the oxide of this salt is precipitated by the ammonia, combined with a portion of it, forming a ternary compound, or a chloride of mercury and ammonia. In the London process, the ammonia, when added to the bichloride of mercury, takes one equivalent of chlorine, so that the mercury is precipitated in the state of a chloride combined with ammonia.

Qualities.—This ammonio-chloride of mercury is inodorous and insipid; of a snowy whiteness, smooth, insoluble in water, and does not become black when triturated with lime-water. It is dissolved by the sulphuric, nitric, and hydrochloric acids; the latter of which restores it to the state of soluble bichloride, the *sal alemroth* of the old chymists. If heated with potassa, it is decomposed, and its ammonia expelled, owing to the combination of the hydrochloric acid with the potassa.[1] It is sometimes adulterated with white lead; to discover which, digest one part of it in four parts of acetic acid, and add to the solution a small quantity of sulphuret of ammonia: a black precipitate, insoluble in sulphuric acid, indicates the presence of lead. Chalk and starch are also sometimes mixed with it; and may be detected by heating the preparation in an iron spoon: if pure, it is completely volatilised; but if adulterated with starch, a black coal is left; or if with chalk, a white powder at the bottom of the spoon. It is said, by Mr. Hennell, to be a compound of 1 eq. of peroxide of mercury, and 1 of hydrochlorate of ammonia. According to Mr. Phillips, its composition is 1 eq. of binoxide of mercury $=218+1$ of bichloride of mercury $+2$ of ammonia $=34$, making the equiv. $=526$.

Medical properties and uses.—This preparation is only used

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[1] *Trans. of the Pharm.* p. 122.

in combination with lard, as an ointment for the cure of itch, and some other cutaneous eruptions.

Officinal preparation. — *Unguentum Hydrargyri Ammonio-Chloridi*, L. *Ung. Hydrargyri præcipitati Albi*, D.

HYDRARGYRUS PURIFICATUS, Edin. *Purified Mercury.*

"Take of mercury, *six parts;* filings of iron, *one part.* Rub them together, and distil from an iron retort."

HYDRARGYRUM PURIFICATUM, Dub. *Purified Mercury.*

"Take of mercury, *six parts.* Distil off slowly four parts."

Syn. Mercure (*F.*), Quecksilber (*G.*), Mercurio (*I.*), Azogogue (*S.*).

By this mode of treating mercury, it is certainly obtained more bright and mobile; but although it is generally supposed that the foreign metals with which the mercury of commerce is said to be alloyed are separated by this process, yet the necessity of it may be well questioned.

HYDRARGYRI CHLORIDUM[1], Lond. *Chloride of Mercury.*

"Take of mercury, *four pounds;* sulphuric acid, *three pounds;* chloride of sodium, *one pound and a half;* distilled water, *as much as may be sufficient.* Boil two pounds of the mercury with the sulphuric acid in a proper vessel, until the bipersulphate of mercury is dry; when this is cold triturate it with two pounds of mercury in an earthen mortar, that they may be perfectly mixed. Then add the chloride of sodium, and rub them together until all globules disappear; afterwards sublime. Reduce the sublimed matter to a very fine powder, and wash it carefully with boiling distilled water, and dry it."

SUBMURIAS HYDRARGYRI MITIS, sive CALOMELAS, Edin. *Mild Submuriate of Mercury*, or *Calomel.*

"Take of muriate of mercury, *four parts;* purified mercury, *three parts.* Rub the muriate in a glass mortar with a little water, in order to prevent the acrid powder from rising, then add the mercury, and again triturate until it be extinguished; put the dried mass into an oblong phial, one third of which only it shall fill, and sublime it in a sand bath. Again triturate the sublimed powder and again sublime it, then reduce it to a fine powder, which is, lastly, to be well washed with boiling distilled water."

CALOMELAS SUBLIMATUM, Dub. *Sublimed Calomel.*

"Take of persulphate of mercury, *twenty-five parts;* purified mercury, *seventeen parts;* muriate of soda, dried, *ten parts.*

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[1] Oldnames, *Aquila alba, Aquila mitigata, Manna metallorum, Panchymagogum minerale, Panchymagogus quercetanus, Sublimatum dulce, Mercurius dulcis sublimatus, calomelas. Hydrargyri submurias*, P. L. 1824.

Rub them together until the globules disappear, and sublime with a sufficient degree of heat. Let the sublimed matter be rubbed to powder, and again sublimed. Pulverize it, and wash it with frequent affusions of distilled water, until the poured-off solution no longer lets any sediment fall on the addition of a few drops of carbonate of kali. Finally, dry it."

Syn. Muriate de Mercure doux (*F.*), Mildes Salzsaures Quecksilber (*G.*), Mercurio dolce sublimato (*I.*).

This very important preparation is a protochloride of mercury. In the process of the London College, the mercury is first formed into a bipersulphate, which being mixed with a quantity of mercury, equal to that contained in the salt, is changed into a protosulphate. Now, when this is submitted to heat in conjunction with the common salt, a double decomposition takes place; the chlorine of the sodium unites with the mercury in equal equivalents, and forms the chloride, whilst the oxygen of the protoxide in the protosulphate oxidises the sodium, forming soda, which combines with the sulphuric acid and forms sulphate of soda. By triturating metallic mercury, as directed by the Edinburgh college, with the bichloride of mercury, the whole mass assumes a grey colour. The sublimation renders the combination of the mercury with the chloride, and its reduction to the state of a protochloride, complete; but this is not the case in the first sublimation; for both metallic mercury and bichloride of mercury are found unchanged in the sublimed mass; and hence the supposed necessity of the second trituration and the subsequent sublimations. By repeating the sublimations too often the product is injured, as a bichloride is formed in each sublimation.

Qualities. — Chloride of mercury, calomel, is obtained, by the above processes, in the form of a dull white semitransparent crystalline mass, the specific gravity of which is 7·175. It is, strictly speaking, a protochloride of mercury, inodorous, insipid, and when pulverised has a light yellow or ivory colour, which deepens by long exposure to the light, owing, perhaps, to a partial decomposition. It is regarded as insoluble, one part requiring 1152 parts of water at 212° for its solution.[1] Nitric acid converts it into the bichloride, much nitrous gas being evolved; and the same change is effected by *chlorine*. Lime-water and the alkalies, when triturated with it, instantly render it black, a circumstance which supplies us with a test of its purity; for if it contain any bichloride, an orange yellow tint is mingled with the black on the addition of lime-water. It is also decomposed by sulphuretted hydrogen; by

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1 Rouelle.

antimony, iron, lead, and copper, and by soap. According to Chenevix, using the terms of the old doctrine, 100 parts of it contain 11·5 of muriatic acid, and 88·5 protoxide of mercury, consisting of 79 of mercury and 9·5 of oxygen; but according to Zaboada, the proportions are, 10·6 of acid, and 89·4 of oxide, consisting of 85 of mercury and 4·4 of oxygen. Correcting these statements, and using the new terms, the constituents of this salt should be according to these chymists,

	Chenevix.	Zaboada.
Chlorine -	14·9 - -	14·04
Mercury - -	85·1 - -	85·96
	100·0	100·00 [1]

According to others, considered as a chloride or protochloride (Hg Cl.), it is composed of

Chlorine -	16	or	1 Chlorine = 35·42
Mercury -	84	"	1 Mercury = 202
	100·00		equivalent = 237·42.

Medical properties and uses. — This is the most useful of the preparations of mercury, and is more generally employed than almost any other remedy in the whole range of the materia medica.[2] It is antisyphilitic, antispasmodic, alterative, deobstruent, purgative, and errhine. As a remedy in syphilis, it can be fully confided in, when its disposition to run off by the bowels is counteracted by opium. In the same state of combination, it is also found efficacious in several convulsive affections, as epilepsy, trismus, and tetanus; and in that species of spasmodic stricture which occurs in virulent gonorrhœa. As an alterative and deobstruent, it is employed with advantage in cutaneous eruptions, as lepra and scabies, in which cases it is combined with antimonials and guaiacum; and in hepatitis, and glandular obstructions. In typhus combined with antimonials, it is our sheet-anchor; and should be given until the mouth is affected. In dropsies it assists the action of elaterium, squill, and foxglove; and as a purgative it may be employed with safety in almost every form of disease not attended with visceral inflammation, or where there is not great irritability and delicacy of habit. Calomel does not act with certainty as a purgative, even in large doses; and,

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[1] *Thomson's Chymistry*, 5th edit. i. p. 467.

[2] It was described, in 1608, by Beguin, who calls it *draco mitigatus*, corrosive sublimate being called by the alchymists *draco*, the dragon; but from Mr. Hatchett's experiments on the calomel of Thibet, it would appear that it has been much longer known to the natives of that part of India.—*Brande's Manual*, p. 302.

therefore, it is generally combined with scammony, jalap, or some other active cathartic. The usual dose, to affect the habit, and produce ptyalism, is from gr. j. to grs. ij., in a pill, with opium, given night and morning; and from grs. iij. to grs. viij. act in general as a purgative: but in some complaints, as yellow fever, hydrocephalus, and croup, for example, in which it is supposed to exert a specific effect, this dose has been repeated every two or three hours, until upwards of 100 grains have been taken in a very short space of time.[1]

On account of its insolubility and great specific gravity, it can be given only in the form of pills and powders.

SUBMURIAS HYDRARGYRI PRÆCIPITATUS, Edin. *Precipitated Submuriate of Mercury.*

"Take of diluted nitrous acid, purified mercury, of each *eight ounces*; muriate of soda, *four ounces and a half*; boiling water, *eight pounds.* Mix the mercury with the diluted nitrous acid, and towards the termination of the effervescence digest with a gentle heat, frequently shaking the vessel. It is requisite, however, that more mercury be mixed with the acid than it can dissolve, so that a completely saturated solution be obtained.

"Dissolve at the same time the muriate of soda in the boiling water; then to this add the other solution while it is yet warm, and mix them very quickly together. After the precipitate has subsided, pour off the saline fluid, and wash the submuriate of mercury by frequent affusions of warm water, which are to be poured off each time after the precipitate subsides, until the water comes off tasteless."

CALOMELAS PRÆCIPITATUM, Dub. *Precipitated Submuriate of Mercury*

"Take of purified mercury, *seventeen parts*; diluted nitrous acid, *fifteen parts.* Pour the acid upon the mercury in a glass vessel, and when the effervescence has ceased, digest with a gentle heat for six hours, with frequent agitation. Then raise the heat, that the solution may boil a little, which is to be poured off from the residual mercury, and quickly mixed with *forty parts* of boiling water, in which *seven parts* of muriate of soda have been previously dissolved: wash the powder that subsides with warm distilled water, as long as the fluid poured off from it yields a precipitate on the addition of a few drops of the solution of (*sub*) carbonate of potassa; lastly, let it be dried."

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[1] Doses of calomel were formerly given which appear almost incredible to the modern physician. Thus Michaelis Alberti informs us, that Helwichius gave ℈ v. for a dose to two patients, and to a third 72 grains, which affected the mouth for a fortnight. Neuterus gave at first gr. xv.; second dose, ℈ j.; third, ʒ ss.; fourth, ʒ j., which he continued till ptyalism was excited. *Halleri Dissert.* vol. vii.

These processes are framed on the process originally suggested by Scheele, and the error into which he was led by reasoning from a false analogy has not been corrected by the colleges; the product of the above process being a mild chloride of mercury, mixed with subnitrate of mercury, which modifies its powers; a smaller proportion also of chloride being obtained than should follow from the quantity of mercury employed. The cause of this effect is, that by dissolving mercury in nitric acid, with the assistance of heat, the metal contained in the acid solution is oxidised to a maximum, and when water is added to it, a subnitrate is precipitated, while a supernitrate remains in solution. Hence, on the addition of the watery solution of chloride of sodium, the water occasions the subnitrate to be precipitated before the decomposition which takes place is effected; at the same time part of the oxide combines with the chlorine of the chloride of sodium, and forms a portion of chloride, which is held in solution with the newly-formed nitrate of soda, while the bichloride is precipitated in combination with insoluble subnitrate of mercury.

To obtain, therefore, the greatest proportion of pure chloride of mercury by precipitation, the nitrate must be prepared slowly and without the aid of heat, which should not be employed in any part of the process. Dr. Murray ascertained, that "the quantity of mild muriate obtained from a solution of ℥j. of mercury in diluted nitric acid in the cold, is a little more than ℥j.; whereas, from the same quantity dissolved with the application of heat, the precipitate did not exceed ℥ss., and the liquor held much more corrosive muriate in solution than the other."[1]

Qualities. — Precipitated chloride of mercury, when properly prepared, is inodorous and insipid. It is whiter, smoother, and lighter than the sublimed preparation, but otherwise agrees with it, both in its chymical qualities and medicinal effects. As prepared, however, according to the directions of the pharmacopœias, subnitrate of mercury, which it contains, may have some effect in altering its powers in a small degree.

Medical properties and uses. — It is said to be more liable to run off by the bowels than common calomel; but as its properties are essentially the same, it may be regarded as a superfluous preparation.

HYDRARGYRI BICHLORIDUM, Lond. *Bichloride of Mercury.*

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[1] *System of Materia Medica, &c.* ii. 319.

"Take of mercury, *two pounds;* sulphuric acid, *three pounds* (by weight); chloride of sodium, *one pound and a half.* Boil the mercury with the sulphuric acid in a proper vessel, until the bipersulphate of mercury become dry: rub this, when it is cold, with the chloride of sodium in an earthenware mortar; then gradually raise the heat, and sublime."

MURIAS HYDRARGYRI CORROSIVUS, Edin. *Corrosive Muriate of Mercury.*

"Take of purified mercury, *two pounds;* sulphuric acid, *two pounds and a half;* dried muriate of soda, *four pounds.* Boil the mercury with the sulphuric acid in a glass vessel placed in a sand bath, until the matter become dry. Mix this, when it is cold, in a glass vessel, with the muriate of soda; then sublime in a glass cucurbit with a gradually raised heat. Separate the sublimed matter from the scoriæ."

HYDRARGYRI MURIAS CORROSIVUM, Dub. *Corrosive Muriate of Mercury.*

"Take of persulphate of mercury, *five parts;* dried muriate of soda, *two parts;* rub the salts together to a fine powder in an earthenware mortar: then sublime the corrosive sublimate in a proper vessel, with a gradually-raised heat, into a receiver."

Syn. Muriate de Mercure corrosif (*F.*), Azzendes alssaures Quecksilber (*G.*), Mercurio sublimato corrosivo (*I.*).

Sulphuric acid does not act upon mercury at a low temperature: but when three parts of this acid are boiled upon two of mercury the metal decomposes the acid and is oxidised, sulphurous gas being emitted with effervescence; and there remains a dry mass of a fine white colour, which is a bipersulphate of the oxide of mercury. By triturating this salt with dried chloride of sodium, and exposing the mixture to heat, a double decomposition is effected. According to the old doctrines, the muriatic acid leaves the soda, and combines with the oxide of mercury of the bipersulphate, while the sulphuric acid unites with the soda, thus forming muriate of mercury and sulphate of soda, the former of which, being easily volatilised, is separated from the latter by sublimation. But, according to the present generally received doctrines, the chlorine of the common salt leaves the sodium, and uniting with the mercury of the bipersulphate, forms a *bichloride* of mercury, which sublimes; while the oxygen of the oxide of mercury combining with the sodium converts it into soda, which, uniting with the sulphuric acid and forming sulphate of soda, remains in the bottom of the cucurbit. This process was first proposed by Kunkel, but no salt has been prepared by a greater variety of methods; and as it is now generally manufactured on the large scale, the proportions of the ingredients ordered by the colleges are perhaps but seldom adopted. Of the three formulæ of the British colleges, however, that of the London College is to be preferred, as by employing the larger proportion of sulphuric acid, and the smaller of chloride of sodium, a more complete decomposition of the chloride of sodium is effected; and, consequently, a greater quantity of chlorine being evolved, a larger proportion of the mercury must necessarily be converted into the bichloride. Sixteen ounces of mercury should yield about ℥ xx. of corrosive sublimate. The most simple process, and perhaps the best, is the direct solution of the red oxide of mercury in hydrochloric acid, by which the salt is obtained by spontaneous crystallisation[1]; but it is too expensive for general purposes.

Qualities. — Bichloride, corrosive muriate, of mercury[2], is obtained by the above process in the form of a white, shining, semitransparent, easily-pulverised mass, made up of small, acicular crystals. When the process is very carefully and slowly conducted, the crystals when separately obtained, are regular tetrahedrons, compressed and pointed. On exposure to the air the mass effloresces on the surface. Its specific gravity is 5·206. It is inodorous, and has a very acrid, disagreeable, metallic taste, and gives an alkaline reaction; water at 60° dissolves one twentieth of its weight, at 212° one third; alcohol at 60° four parts. It is soluble also in the sulphuric, nitric, and hydrochloric acids, and may be again obtained unaltered by evaporating the solutions. The fixed alkalies and alkaline earths decompose it, precipitating it from its solution of an orange-yellow colour, which becomes brick-red. It is also partially decomposed by exposure to light, and by some metals; and changed into calomel.[3] The carbonates of the fixed alkalies precipitate it of a fixed yellow hue, and ammonia forms with it a white, triple, insoluble, compound, the ammonio-chloride of mercury. When triturated with olive oil, the oil is whitened; and when boiled with it, a small portion of calomel is thrown down; and the same is the case when it is boiled with sugar. The volatile oils reduce it. It is also decomposed by solutions of tartrate of potassa and antimony, nitrate of silver and acetate of lead; and forms precipitates in infusions and decoctions of the following vegetable substances: — camomile flowers, horse-radish root,

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[1] *Annales de Chimie*, xxviii. 12.

[2] The old names were *Hydrargyrus Muriatus, Mercurius sublimatus corrosivus, Hydrargyri oxymurias*, P. L. 1824.

[3] Mr. Chenevix found, "that if a bit of copper be put into a solution of corrosive sublimate, a white powder shortly falls to the bottom; and that powder is calomel. When washed, it does not contain an atom of copper, nor of corrosive sublimate."

columba root, catechu, cinchona bark, rhubarb root, senna leaves, simaruba bark, oak bark, tea; consequently it is incompatible in extemporaneous formulæ with these substances. The components of this salt are 25·46 parts of chlorine, and 74·54 of mercury in 100 parts; taking the analysis of Zaboada, and correcting it so as to make it correspond with the real composition of the bichloride.[1] According to Mr. Phillips, the proportions are of chlorine 26·27, of mercury 73·73 parts in 100; or of 2 eq. chlorine $(35{\cdot}42 \times 2) = 70{\cdot}84$, and 1 of mercury $= 202$; making the equivalent 272·84 ($Hg\ Cl^2$.).

Medical properties and uses.—This salt has been long known to chymists.[2] It is a powerful stimulant and alterative; and in large doses is one of the most violent of the metallic poisons. As an antisyphilitic it was early much extolled, and is the active ingredient of many a celebrated empirical nostrum; but modern practice has fixed its real merits much lower than they were formerly placed. When taken in over doses, either by mistake, or designedly as a poison, the best antidote is white of egg *diluted* with water, and given in large, frequently repeated doses. The albumen decomposes the bichloride, reducing it to the state of the chloride, while the compound which it forms with it exerts no deleterious effect on the stomach.[3] M. Taddei has found that gluten and rye-meal are equally serviceable as antidotes to this poison. He ascertained that gr. j. of the bichloride is neutralised by 13 grains of dried gluten, and by 500 to 600 grains of rye-meal.[3] The presence of bichloride of mercury in any solution suspected to contain it may be detected by putting into the fluid a sovereign, with a piece of clean polished copper wire wound around it: if the poison be present, the gold will be covered with a white coating, which acquires a metallic lustre when rubbed. Another very ingenious galvanic mode of detecting it is a modification of one proposed by Mr. Sylvester. He recommended to bend a piece of iron wire, three inches long, into this shape ⊓ and tie the two ends to a common gold wedding ring: on a plate of glass, placed horizontally, drop some sulphuric acid, diluted with six parts by weight of water, till it spread the size of a halfpenny; and then, at a little distance, some of the solution supposed to contain the sublimate, till the two edges of the liquids join, and place the wire and the ring in such a manner that the wire may touch the acid and the ring the solution. If any sublimate be present, the ring will in a few minutes be

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[1] *Thomson's Chemistry*, 5th edit. vol. i. p. 465.

[2] The preparation is said to have been long known to the Chinese, and it is mentioned by Rhazis and Avicenna. Bergman, iv. 281.

[3] *Giornale di Fisica et Isis*, 4. 1. 1823, p. 419.

coated with mercury, where it touches the solution. The modified test is simply to drop a little of the suspected solution on a gold watch held in one hand, and to touch it with a key or the point of a penknife, held in the other; a galvanic circle is thus formed; the solution is decomposed, and forms an amalgam of mercury and gold on the spot if bichloride of mercury be present.

Bichloride of mercury sometimes succeeds in curing the primary symptoms of syphilis; but it as often fails: it checks the progress of the secondary symptoms, relieving venereal pains, and healing ulcers of the throat; "yet even in these cases," says Mr. Pearson, "it never confers permanent benefit; for new symptoms will appear during the use of it; and on many occasions it will fail of affording the least advantage to the patient from first to last."[1] I have found it most useful when dissolved in nitric acid. It is given with more advantage in some other affections, as old ulcers, chronic rheumatism, and some cutaneous diseases, particularly lepra; in which Willan justly affirms, that it is the only useful preparation of mercury, "its operation being promoted by giving at the same time an antimonial[2];" and the decoction of dulcamara. Its sensible operation is by urine; but sometimes it occasions the most violent nausea, griping and purging; in which cases it should be combined with opium: and it is always necessary to take, during its use, some mucilaginous fluid, to moderate the irritation it is apt to induce. It is also used as an external application; in which case the best vehicle is the bitter almond emulsion: and it has the property of preventing this emulsion from fermenting. The dose is from gr. one eighth to gr. one fourth, twice a day, made into a pill with crumb of bread or extract of poppies. The dose is best divided by adding an equal weight of hydrochlorate of ammonia.

Officinal preparations.—*Liquor Hydrargyri Bichloridi*, L. *Hydrargyri Chloridum*, L. E. D. *Hydrargyri Ammonio-chloridum*, L. *Hydrargyri Binoxydum*, L. *Hydrargyri Submurias mitis*, E. *Calomelas Sublimatum*, D.

LIQUOR HYDRARGYRI BICHLORIDI, Lond.
Solution of Bichloride of Mercury.

"Take of bichloride of mercury, hydrochlorate of ammonia, each *ten grains;* distilled water, *a pint.* Dissolve the bichloride of mercury and the hydrochlorate of ammonia in the water."

This solution is intended to facilitate the administration of minute doses of bichloride of mercury, each fluid ounce of the solution containing half a grain of the salt. It ought not

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[1] *Pearson on Remedies for Lues Venerea, &c.* 116.
[2] *Willan on Cutaneous Diseases,* 140.

to be long kept or exposed to a clear light, as the bichloride is gradually decomposed, and calomel precipitated. It is, however, the most safe and convenient form of administering this active salt; and it may be given as an antisyphilitic in doses of from f ʒss. to ʒij. in f ℥ij. of linseed infusion, or of water and syrup, and in more minute doses, when its alterative effects only are required. As a local application, this solution, diluted with two parts of water, forms a useful gargle in venereal sore throat; and without dilution we have found it serviceable as a gargle for breaking the abscess in cynanche tonsillaris, when suppuration takes place. Diluted with an equal quantity of water, it is employed as a wash against tetters and scabies; and very largely diluted, it may be used as an injection in gonorrhœa; and given in the form of enema, when the stomach will not receive it. With lime-water, in the proportion of gr. j. of the salt to f ℥ j. of lime-water, it forms the yellow wash.

HYDRARGYRI BICYANIDUM, Lond. *Bicyanide of Mercury.*

"Take percyanide of iron, *eight ounces;* binoxide of mercury, *ten ounces;* distilled water, *four pints.* Boil them together for half an hour, and filter. Evaporate the solution that crystals may form. Wash, frequently, what remains with boiling distilled water, and again evaporate the mixed liquors that crystals may be formed.

"Bicyanide of mercury may be also prepared by adding as much binoxide of mercury as will accurately saturate hydrocyanic acid, distilled from ferrocyanide of potassium, with diluted sulphuric acid."

In this process, the Prussian blue and binoxide of mercury are reciprocally decomposed: the cyanogen of the former quitting the iron combines with the mercury of the binoxide, whilst the oxygen of the latter combines with the iron of the percyanide, and forms a sesquioxide of iron. The two new compounds are easily separated, owing to the solubility of the bicyanide of mercury, and the insolubility of the sesquioxide of iron, which remains upon the filter.

The second process is as easily explained. The oxygen of the binoxide unites with the hydrogen of the hydrocyanic acid, whilst the cyanogen combines with the mercury: two equivalents of the acid being required to decompose one of the binoxide, a bicyanide is the result.

HYDRARGYRI CYANURETUM, Dub. *Cyanuret of Mercury.*

"Take of cyanuret of iron, *six parts;* nitric oxide of mercury, *five parts;* distilled water, *forty parts.* Mix together the cyanuret of iron and the oxide of mercury, then add the water heated. Boil the mixture for half an hour, constantly agitating it, and filter through bibulous paper. Wash the residue with hot distilled water. Finally, evaporate the liquor, so that, when filtered and cooled, crystals may form."

Qualities.—The bicyanide of mercury is a nearly colourless salt, crystallizing in quadrilateral prisms. It has an acrid, metallic taste; is soluble in water at 60°, and more so at 212°: but scarcely soluble in alcohol. It is soluble in nitric acid without decomposition: but it is decomposed by heat, sulphuric acid; with hydrochloric acid hydrocyanic acid is evolved, and bichloride of mercury formed. It is also decomposed by sulphuretted hydrogen, and the hydrosulphates. Bicyanide of mercury is a compound of 2 eq. of cyanogen = 52·78 + 1 of mercury = 202, making the equivalent 254·78 or 20·4 of cyanogen + 79·6 of mercury in 100 parts (Hg. Cy.)

Medical properties and uses. — This salt is employed in the same diseases, and in similar doses, as the bichloride of mercury. It is also employed for the preparation of hydrocyanic acid.

Officinal preparation. — *Acidum Hydrocyanicum*, L.

HYDRARGYRI IODIDUM, Lond. *Iodide of Mercury.*

"Take of mercury, *an ounce;* iodine, *five drachms;* alcohol, *as much as may be sufficient.* Rub together the mercury and the iodine, adding gradually the alcohol, until no more globules are visible. Dry immediately the powder in a gentle heat, excluded from the light, and preserve it in a well stopped vessel."

An immediate union takes place between the mercury and the iodine, and a greenish yellow powder is formed, which sublimes by heat undecomposed, in the form of red scales, which acquire an orange yellow colour in cooling. It is insoluble in water, and only partially so in alcohol: but it is soluble in æther. Light decomposes and blackens it; but it is less liable to decomposition when it has been sublimed. It is a compound of 1 eq. of iodine = 126·3 + 1 of mercury = 202, making the equivalent = 328·3 (Hg I.) or of 55·5 of iodine + 44·5 of mercury in 100 parts.

Medical properties and uses. — This iodide possesses alterative and stimulant properties, similar to those of the other mercurial salts. It was first introduced as a therapeutical agent in scrofula, and for the cure of syphilitic ulcers in those of scrofulous habits. The dose is from $\frac{1}{8}$ to $\frac{1}{2}$ a grain in pills.

HYDRARGYRI BINIODIDUM, Lond. *Biniodide of Mercury.*

"Take of mercury, *an ounce;* iodine, *ten drachms;* alcohol, as much as may be sufficient. Rub together the mercury and the iodine, adding the alcohol gradually, until globules are no longer visible. Dry the powder with a gentle heat, and preserve it in a well stopped vessel."

As in the former preparation, the combination of the iodine and the mercury is in this case immediate. The preparation has a red colour, and sublimes in rhombic scales of a yellow colour, which as they cool, again assume a brilliant scarlet hue. They are insoluble in water, but soluble in alcohol, iodide of potassium, and some acids. When dissolved in a hot solution of pernitrate of mercury it crystallizes out, on cooling, in beautiful red scales. It is a compound of 1 eq. of mercury$=202+2$ of iodine$=252{\cdot}6$, making the equivalent $=454{\cdot}6$ ($Hg\ I^2$.)

Medical properties and uses.—This iodide possesses powerful alterative properties, and may be administered in the same cases as the protiodide. I have found it most beneficial in cases of secondary syphilis, administered at the same time as the iodide of potassium. The dose is gr. $\frac{1}{11}$ to gr. $\frac{1}{4}$, in pills made up with crumb of bread. An ointment, prepared with grs. x. of the biniodide and ℥ j. of lard, is useful in ulcers, similar to those in which the ointment of the binoxide of mercury is recommended.

HYDRARGYRI SULPHURETUM CUM SULPHURE[1], Lond. *Sulphuret of Mercury with Sulphur.*

"Take of mercury, sulphur, *each a pound.* Triturate them together until the globules disappear."

SULPHURETUM HYDRARGYRI NIGRUM, Edin. *Black Sulphuret of Mercury.*

"Take of purified mercury, sublimed sulphur, of each *equal weights.* Rub them together in a glass mortar with a glass pestle, until the globules of mercury altogether disappear. It may also be made with double the quantity of mercury."

HYDRARGYRI SULPHURETUM NIGRUM, Dub. *Black Sulphuret of Mercury.*

"Take of purified mercury, of sublimed sulphur, each *one part.* Rub them together in an earthen mortar until the globules disappear."

Syn. Sulphure de Mercure noir (*F.*), Schwarzes Schwefelquecksilber (*G.*), Solfwio di Mercurio nero (*I.*).

During the trituration of the mercury with the sulphur, Fourcroy supposed that the metal is imperfectly oxidized by attracting oxygen from the atmosphere; but this opinion has been disproved by the experiments of Proust[2]; and a chy-

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[1] Hydrargyrus e sulphure, P. L. 1787. Hydrargyri sulphuretum nigrum, P. L. 1824.

[2] *Journal de Physique*, liii. 92.

mical combination is effected between the mercury and the sulphur. Mr. Brande[1] regards it as a compound of 58 parts of bisulphuret of mercury and 42 of sulphur, and this opinion accords with that of Mr. Phillips.[2]

Qualities. — Black sulphuret of mercury is in the form of a very black, impalpable, inodorous, insipid powder. When heated in an open vessel it emits sulphurous acid gas; becomes first of a deep violet hue, and afterwards sublimes of a brilliant red colour; being converted into the bisulphuret and mercury. It is often ill prepared, which may be known by rubbing a portion of it on gold; to which, if it be good, no whiteness will be communicated. It is, also, sometimes adulterated with ivory black, which may be detected in it by throwing a little of the suspected sulphuret on a red-hot iron: if ivory black be present, some ashes will be left after the volatization: but the pure sulphuret is completely dissipated. It consists of 1 eq. of mercury $=202+1$ of sulphur $=16{\cdot}1$, making the equivalent $=218{\cdot}1$ (Hg S.)

Medical properties and uses. — This mercurial preparation is mildly alterative. It is chiefly employed against scrofulous swellings, and in cutaneous affections. But it is on the whole a very uncertain preparation, and requires to be long used to produce any sensible effects. The dose is from grs. v. to ʒss., given twice or three times a day.

HYDRARGYRI BISULPHURETUM[3], Lond. *Red Sulphuret of Mercury.*

"Take of mercury, *two pounds;* sulphur, *five ounces.* Having melted the sulphur over the fire, mix in the mercury, and, immediately the mass swells, remove the vessel from the fire, and cover it strongly to prevent it from catching fire; then rub to powder and sublime."

HYDRARGYRI SULPHURETUM RUBRUM, Dub. *Red Sulphuret of Mercury.*

"Take of purified mercury, *nineteen parts;* sublimed sulphur, *three parts.* Mix the mercury with the melted sulphur; and if the mixture take fire extinguish it by covering the vessel; then rub the mass to powder, and sublime it."

Syn. Sulphure de Mercure rouge (*F.*), Zinnober (*G.*), Solfuro di Mercurio rosso (*I.*), Cinabrio (*S.*), Shengerf (*H.*).

By these processes the mercury and sulphur are more intimately combined, and a bisulphuret is produced. The inflammation which is apt to happen after the mixture of the

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1 *Manual of Pharmacy*, p. 303.

2 *Trans. of Pharm.* 1837. p. 245.

3 Cinnabaris factitia, P. L. 1754. Hydrargyrus sulphuretus ruber, P. L. 1787. Hydrargyri sulphuretum rubrum, P. L. 1824.

mercury with the melted sulphur, when the mass swells and explodes, as frequently occurs, is similar to the combustion during the union of sulphur by heat with some other metals, independent of the presence of air; hence, covering the vessel, without removing it from the fire, does not check the combustion, although, by excluding the air, a real inflammation of the materials is prevented. In the second part of the process great caution is necessary to prevent the neck of the vessel in which it is sublimed from being choked up by the sublimed sulphuret; as by the occurrence of such an accident the vessel would be burst by the confined vapours. To avoid this, a wide-necked vessel should be used.

The cinnabar of commerce, which is chiefly used as a pigment, is manufactured in Holland on a very extensive scale[1]; and the following method has been proposed by Mr. Kirchoff, for obtaining it in the humid way. First, form ethiops mineral, by triturating, in a porcelain cup, with a glass pestle, 300 grains of mercury, and 68 of sulphur, moistened with a few drops of solution of potassa, and then add to it 160 grains of potassa, dissolved in an equal weight of water. Heat the vessel with the ingredients over the flame of a candle continuing the trituration, and adding, as the fluid evaporates, pure water from time to time, so as to keep the ingredients covered to the depth of an inch. At the end of two hours, if the trituration have been continued, the colour of the mixture changes from black to brown, and then to red; after which no more water should be added, but the trituration must be uninterruptedly continued until the mass have acquired the consistence of a jelly, and the red colour attained considerable brightness and beauty; the heat must be then immediately withdrawn, otherwise the red soon changes to a dirty brown.[2]

Qualities. — Red or bisulphuret of mercury, factitious cinnabar, is a powder of a very bright red colour, which is inodorous, insipid, and insoluble in water, alcohol, and the majority of acids. It is decomposed, however, by nitro-hydrochloric acid, which combines with the mercury, and disengages the sulphur: but it is not altered by solutions of the alkalies, even when boiled with them; although lime, potassa, soda, and most of the metals, decompose it when distilled with it. According to Proust, 100 parts of this sulphuret consist of 85 of mercury, and 15 of sulphur; but according to the later experiments of Guibert[3], the proportions

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[1] See a description of the method, *Annales de Chimie,* li. 196.
[2] *Nicholson's Journal,* 4to. ii. 1.
[3] *Journ. de Pharmacie,* Août, 1816, p. 374.

are 86·1803 of mercury, and 13·8197 of sulphur: Mr. Phillips states them at 13·6 of sulphur + 86·4 of mercury. In equivalents, it consists of 1 eq. of mercury = 202 + 2 of sulphur = 32·2 = 234·2 ($Hg\ S^2$). This preparation is sometimes adulterated with red lead, dragon's blood, and chalk; the first is discovered by the same process as was described for discovering it in the red oxide; spirit of wine detects the second by extracting the colouring matter; and the last is discovered by an effervescence being excited by hydrochloric acid; and the production of sulphate of lime on adding sulphuric acid.

Medical properties and uses. — Bisulphuret of mercury is alterative and deobstruent. It was formerly much used in cutaneous diseases, gouty and rheumatic affections, and in worms. It is now, however, scarcely ever prescribed. It has been recommended for fumigations in syphilis; but, on account of the sulphurous vapours, it is less fit for this purpose than the grey oxide. The dose for internal use is from grs. x. to ʒss. made into an electuary or bolus.

SUBSULPHAS HYDRARGYRI FLAVUS[1], Edin. *Yellow Subsulphate of Mercury.*

"Take of purified mercury, *two parts;* sulphuric acid, *three parts.* Put them into a glass cucurbit, placed in a sand bath, and boil them to dryness. Pulverize the white mass which is left at the bottom of the vessel, and throw it into boiling water. It will immediately be converted into a yellow powder, which is to be washed with frequent affusions of warm water."

SULPHURICUM OXYDUM HYDRARGYRI, Dub. *Sulphuric Oxide of Mercury.*

"Take of persulphate of mercury, *one part;* boiling water, *twenty parts.* Rub these together in an earthenware mortar, and pour off the supernatant fluid: wash the yellow powder with hot distilled water as long as the dropping of a little solution of caustic potassa into the affused fluid causes a precipitate; finally, dry the sulphuretted oxide of mercury."

Syn. Subsulphate de Mercure (*F.*), Gelbes Schwefelsaurez Quecksilberoxyd (*G.*), Turpeto Minerale Mercuriale (*I.*).

Sulphuric acid scarcely acts on mercury unless aided by a high temperature. When it is boiled on it, as directed in these processes, the acid is partially decomposed by the metal, which is oxidized, while sulphurous gas is evolved; and the oxide thus formed uniting with the remaining acid, the whole becomes a bipersulphate of mercury. When boiling water is poured on this salt, the fluid acting by its powerful affinity

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[1] *Hydrargyrus vitriolatus,* P. L., 1787.

for sulphuric acid, decomposes it, abstracts the acid, and precipitates the oxide; but as the acid still holds combined with it a small portion of oxide, and the precipitated oxide retains some acid, the result of this part of the process is a supersulphate of mercury held in solution by the water, and a subsulphate precipitated in the form of a yellow powder. To obtain this effect completely, the saline mass must be made entirely dry before pouring over it the hot water; for if the vessel be sooner taken from the fire, the precipitation is partial only, the greater part of the salt being dissolved without being decomposed. Perhaps the best mode is to continue the exsiccation until a little of the white mass thrown in cold water does not redden litmus paper.

Qualities.—Subsulphate of mercury is inodorous, and acrid to the taste. It is obtained in the form of a beautiful bright yellow powder, of a specific gravity of 6·444, and nearly insoluble in water, requiring 2000 parts at 60°, and 600 at 212°, for its solution, which is colourless. By trituration with mercury, it is changed into the protoxide; and at a red heat is decomposed, the oxygen being given out and the metal reduced. According to the analysis of Braumcamp and Segueira, its constituents are 84·7 parts of peroxide of mercury, 15 of sulphuric acid, and 3 of water[1]: Fourcroy makes them 87 of oxide, 10 of acid, and 3 of water. In equivalents its constituents are 1 eq. of peroxide of mercury $=218+1$ of sulphuric acid $=40·1=258·1$ ($\ddot{H}g\,\dddot{S}$).

Medical properties and uses.—This preparation is emetic, discutient, alterative, and errhine; but from the violence of its action it is seldom administered as an internal remedy. As an errhine, however, it has been found extremely useful in chronic ophthalmia and diseases of the head; but even for this purpose its acrimony requires to be sheathed with some bland powder, as starch, or liquorice-root powder, in the proportion of grs. v. to gr. j. of the subsulphate. In doses of grs. v. it operates as a very powerful emetic.

In concluding the account of the preparations of mercury, it may not be improper to observe that the exhibition of any of them in certain states of the habit, when at the same time, the body is under exposure to cold, is apt to excite an erythematic eruption of the skin, accompanied with much fever. This disease does not at all depend on the use of any particular preparation of the remedy; but, as far as I have been able to observe, it is liable to show itself in such an irritable state of the habit as produces hysteria in females, when the

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[1] *Annales de Chimie*, liv. 123.

body is very suddenly exposed to a current of cold air, or to a cold moist atmosphere, while under the influence of mercury. When it occurs, the mercurials must be immediately discontinued, bark, opium, and purgatives internally administered; and the affected surface sprinkled with dry flour, or covered with the *linimentum aquæ calcis* of the Edinburgh and Dublin Pharmacopœias; while at the same time the warm bath is to be used at least twice a day. Under this treatment the disease generally disappears, and the use of the mercurial may be renewed; but sometimes the morbid symptoms increase under every mode of treatment, and a fatal termination of the disease ensues.

PRÆPARATA EX MAGNESIO.

PREPARATIONS OF MAGNESIA.

MAGNESIA, Lond. *Magnesia.*

"Take of carbonate of magnesia, *four ounces.* Burn the carbonate in a very strong fire for two hours, or until no effervescence is excited when acetic acid is dropped on it."

Edinburgh.

"Let (*sub*) carbonate of magnesia be exposed in a crucible to a red heat for two hours; after which preserve it in close-stopped bottles."

MAGNESIA, Dub. *Calcined Magnesia.*

"Take of magnesia, *any quantity.* Let it be put into a crucible, and subjected to a strong heat for two hours; and when it has cooled, preserve it in a well-closed glass vessel."

Syn. Magnesie (*F.*), Gebrannte Magnesia (*G.*), Gebrennte Bidderzoutard (*Dutch*), Magnesia (*I.*).

The carbonic acid and water are expelled by the heat, and the pure earth remains in the proportion of five twelfths of the weight of the carbonate employed: or, ℥ j. leaves 200 grs. of magnesia.[1]

Qualities.—It is inodorous and insipid; in the form of a white, very light, soft powder, having a specific gravity of 2·3. It has an alkaline reaction; does not effervesce with acids; is infusible; and requires for its solution 5142 parts of water at 60°, and 36,000 at 212°.[2] It does not become hot when mixed

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[1] *Black on Magnesia Alba*, 28. [2] Fyfe.

with water, as lime does; and water filtered through it does not affect the vegetable blues. It is a hydrate, and when exposed to the air it attracts slowly carbonic acid. It is a compound of 60 parts of *magnesium*, and 40 of oxygen, in 100 parts; or of 1 eq. of magnesium = 12·7 + 1 of oxygen = 8, making the equivalent 20·7 ($\dot{M}g$)

Medical properties and uses. — The same as those of the carbonate. It sometimes contains lime, which is discovered by a precipitate falling when oxalate of ammonia is added to its solution in sulphuric acid. Its dose is from grs. x. to ʒss. taken in water or milk.

MAGNESIÆ CARBONAS[1], Lond. *Carbonate of Magnesia.*

"Take of sulphate of magnesia, *four pounds;* carbonate of soda, *four pounds eight ounces;* distilled water, *four gallons.* Dissolve separately the carbonate of soda and the sulphate of magnesia in two gallons of the water, and filter; then mix the solutions, and boil, with constant stirring, for a quarter of an hour. Lastly, the liquor being poured off, wash the precipitated powder with boiling distilled water, and dry it."

CARBONAS MAGNESIÆ, Edin. *Carbonate of Magnesia.*

"Take of sulphate of magnesia, *four parts;* subcarbonate of potassa, *three parts;* boiling water, *a sufficient quantity.* Dissolve the salts separately in twice their weight of water, and strain, or otherwise free from impurities; then mix them, and instantly add eight times their weight of boiling water. Boil the liquor for a short time, stirring it; then let it remain at rest until the heat be a little diminished, and strain it through linen, upon which the carbonate of magnesia will remain. The carbonate, after being well washed with pure water, is to be dried with a gentle heat."

MAGNESIÆ CARBONAS, Dub. *Carbonate of Magnesia.*

"Take of sulphate of magnesia, *twenty-five parts;* carbonate of potassa, *fourteen parts;* boiling water, *forty parts.* Dissolve the sulphate of magnesia and the carbonate of potassa, each in two hundred parts of water. Mix together the defecated liquors; then boil the mixture for a short time, and strain it while it is hot through linen stretched in a proper manner for collecting the magnesia. Wash away the sulphate of potassa by repeated affusions of boiling water; and finally, dry the carbonate of magnesia.

Syn. Carbonate de Magnésie (*F.*), Kohlensaure Magnesia (*G.*), Carbonato di Magnesia (*I.*).

The product of these processes is a compound of magnesia;

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[1] *Magnesiæ subcarbonas,* P. L. 1824.

in the carbonate, 11·48 of magnesia; in the hydrate, 38·42 of carbonic acid, and 15·76 of water.[1] Mr. Phillips states the components to be carbonic acid 52·4, and magnesia 47·6, in 100 parts[2]; or 1 eq. of magnesia = 20·7 + 1 of carbonic acid = 22·12; making the equivalent 42·82 ($\dot{M}g.\ddot{C}$.) In its production the salts are decomposed, and a double exchange takes place; the sulphuric acid separates from the magnesia, and unites with the soda of the carbonate, disengaging the carbonic acid, which in its turn combines with the magnesia. The success of the operation depends very much on the degree of attention which is paid to the following circumstances. The water employed in every part of the process must be very soft; either rain water, or pure distilled water: the carbonate of soda should be previously freed as completely as possible from any admixture of silica, by passing through the alkaline solution a current of carbonic acid, or exposing it to the air for some time before it be used, and the mixing the salts in small portions of water; and after boiling the mixture, throwing it into a large quantity of water. Mr. Henry recommends to pour off the water by inclination, and to put the precipitate upon chalk stones for a little time; after which it is to be wrapped up in sheets of white paper, and dried before the fire.[3]

The greater part, however, of the carbonate of magnesia found in the shops is prepared, on a great scale, from bittern, the liquor remaining after the crystallization of common salt from sea water. The bittern is heated to 212°, a solution of impure carbonate of potassa instantly added to it, and the fire withdrawn. The other steps of the process resemble those above detailed. It is frequently adulterated with chalk, and sometimes gypsum: the former is detected by adding a little diluted sulphuric acid, which converts the magnesia into soluble sulphate, but produces an insoluble salt with the lime of the chalk. Gypsum is detected by boiling a portion of the magnesia in distilled water, and adding to the solution chloride of barium, which will produce an insoluble precipitate, if gypsum be present.

Qualities. — Carbonate of magnesia is inodorous and insipid; perfectly white, very light, smooth to the touch, nearly insoluble in water, and effervesces with acids. Its specific gravity is 0·295.[4] It is decomposed by all the acids, the alkalies, the neutral and metallic salts, lime, baryta, alumina,

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1 *Henry's Elements*, 9th edit. i. 594.
2 *Trans. of the Pharm.* p. 78.
3 *Henry's Experiments on the Preparation, &c. of Magnesia*, 8vo. Lond. 1773.
4 *Hoffmanni Op.* iv. 473.

and by a strong heat; these substances are therefore incompatible in prescriptions with it.

Medical properties and uses. — Carbonate of magnesia is antacid. It is a useful remedy in acidity of the primæ viæ, particularly of children, in aphthous fever, and that which attends dentition. The compound formed by its union with an acid in the stomach is purgative; but if no acid be present, magnesia does not appear to increase in any degree the peristaltic motion of the bowels. It is preferable to chalk and other absorbents in heartburn, when the bowels are costive; and has been given with advantage in dysentery, combined with ipecacuanha and opium, and the dose followed by a draught of lemonade. In calculus, when the concretions are formed in the kidney, no remedy is so efficacious. The extrication of the carbonic acid in the gaseous state, when the carbonate is decomposed by acid in the stomach, sometimes proves inconvenient from the distension it occasions; but more generally it is beneficial. The usual dose is from ʒss. to ʒij., taken in water or milk.[1]

Officinal preparations. — *Magnesia,* L. E. D. *Mistura camphoræ cum Magnesia,* D. *Hydrargyrum cum Magnesia,* D.

PRÆPARATA E PLUMBO.

PREPARATIONS OF LEAD.

PLUMBI ACETAS, Lond. *Acetate of Lead.*[2]

"Take of oxide of lead, rubbed to powder, *four pounds and two ounces;* acetic acid, distilled water, each *four pints.* Mix the acid with the water, and add the oxide of lead to them, and dissolve it with a gentle heat; then filter. Lastly, evaporate the solution, that crystals may form."

ACETAS PLUMBI, Edin. *Acetate of Lead.*

"Take of white oxide of lead, *any quantity;* weaker acetic acid, *a sufficient quantity.* Put the oxide into a cucurbit, and pour over it ten times its weight of the acid. Let the mixture

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[1] The empirical nostrum, sold under the name of DALBY'S CARMINATIVE consists of carbonate of magnesia, ℈ij., oil of peppermint ♏j., oil of nutmeg ♏ij., oil of aniseed. ♏iij., tincture of castor ♏xxx., tincture of assafœtida ♏xv., spirit of pennyroyal ♏xv., compound tincture of cardamoms ♏xxx., and peppermint water fʒij.

[2] Saccharum Saturni, P. L. 1720—45. Cerussa acetata, P. L. 1787. Plumbi superacetas, P. L. 1809.

stand upon a warm sand bath until the acid become sweet; then let this be poured off, and add fresh portions of acid successively until no more sweetness is communicated. Evaporate all the fluid, freed from impurities, in a glass vessel, to the consistence of thin honey, and set it aside in a cold place, that crystals may form, which are to be dried in the shade. Evaporate again the residuary liquor, that new crystals may be obtained; and repeat the evaporation until no more are formed."

PLUMBI ACETAS, Dub. *Acetate of Lead.*

"Take of carbonate of lead, called CERUSSA, *any quantity;* distilled vinegar, *ten times its weight.* Digest them in a glass vessel until the vinegar become sweet; and having poured this off, add more until it cease to become sweet. Filter the solution, and crystallize by alternate slow evaporation and cooling. Dry the crystals in the shade."

Syn. Acetate de Plomb crystallisé (*F.*), Essigsaures Blei (*G.*), Zucchero di Saturno (*I.*).

In the London process the acetic acid unites with the oxide after evaporation; and the salt crystallizes in the form of an acetate. But on account of the expense of the process, the preparation of this salt is seldom undertaken by the apothecary. The acetate (*sugar of lead*), usually found in the shops, which is manufactured on a large scale for the use of the calico printers, is purified. It is chiefly prepared in Holland, in the following manner:—Sheets of lead, coiled up, are put into pots, in which they are half immersed in distilled vinegar, and digested a sufficient time: the upper half, or that which is not immersed, is covered with an efflorescence of carbonate of lead, after which it is immersed in the vinegar, and the part which was before immersed is now brought up to be converted into carbonate as before, when the plate is again turned; and this is repeated many times, until the vinegar become milky. This solution is next boiled in tinned vessels down to about one third of the original quantity, then strained, and the salt crystallized by slow cooling. The crystals obtained by a second evaporation of the mother-water are brown and deliquescent[1]; and the whole requires to be again dissolved in rain or distilled water, and recrystallized.

Qualities.—This salt, when pure, is inodorous, has a sweet, astringent taste, and crystallizes in white, glossy, oblique-angled[2] six sided prisms, which are generally aggregated into irregular masses. Its specific gravity is 2·35.[3] Acetate of

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1 *Aikin's Dictionary of Chymistry,* ii. 26.
2 *Phillips's Trans. of the Pharm.* 1824.
3 Hassenfratz.

lead slightly effloresces: it is soluble in 25 parts of distilled water, either hot or cold; but after standing for some time, a slight decomposition takes place, and a small portion of white powder is deposited, which is an insoluble carbonate. It is also soluble in alcohol. In pump or hard water, which always contains carbonic acid, it is instantly decomposed, forming a milky solution, and a copious precipitate falls; it is also decomposed by the alkalies and their carbonates, most of the acids and neutral salts, lime and its salts, magnesia and its carbonate and sulphate, and all the sulphurets; but it is not affected by a solution of gum. The constituents of 100 parts are 58·9 of oxide of lead, 26·8 of acid, and 14·3 of water[1]; or of 1 eq. of oxide of lead $=111{\cdot}6+1$ of acetic acid $=51{\cdot}48+3$ of water $=27$; making the equivalent 190·08 ($Pb\,\bar{A}$.)

Medical properties and uses.—Taken internally, acetate of lead is a very powerful sedative astringent. It is a valuable remedy in pulmonary, uterine, and intestinal hæmorrhages; in restraining which it has a very powerful influence. Combining it with opium is supposed to prevent the deleterious effects which salts of lead are apt to produce when taken into the stomach; but this is an erroneous opinion. It is more advantageously administered with diluted distilled vinegar, to prevent its change into the carbonate, which renders it poisonous. Some years ago, Dr. Hildebrand, of Lemberg, tried this salt in combination with opium, with seeming advantage, in phthisis; and it has been since occasionally used in this country; but, as far as I have observed, it is not likely to be generally employed by British practitioners. Dissolved in a large proportion of water, with a small quantity of distilled vinegar to prevent decomposition, it forms an excellent collyrium in ophthalmia; and somewhat less diluted, its solution is in common use as an external application in superficial inflammation. Objections have, nevertheless, been raised to the long-continued external use of the preparations of lead; but the daily extensive employment of them in this form, without any bad effects, is a sufficient proof that, if they occasionally have produced mischief, it is to be attributed to the chance of their change into the carbonate, which is the only direct poison among the salts of lead.

The dose of acetate of lead, when internally exhibited, is from grs. iij. to grs. x., given every six or eight hours. It may be made into a pill with crumb of bread, with or without opium, according to the circumstances of the case. As a collyrium or lotion, the proportions may be from grs. x. to

[1] *Phillips's Trans. of the Pharm.* 1824.

℈j. of the salt in f ℥ viij. of distilled water. In every instance in which this salt causes colica pictonum it is converted into carbonate of lead, which, as I have already said, is the only poisonous salt of lead: thence the addition of distilled vinegar is necessary to prevent decomposition; and this is also requisite on the same account in prescribing it as a lotion when distilled water is not employed. Many practitioners object even to the external application of salts of lead; but I have used them extensively, and have never found any bad effects to result from them, except in fermenting poultices, in which they are changed into the carbonate. (For the mode of counteracting these bad effects, see *Plumbi Carbonas*, Part II.)

Officinal preparations. — *Ceratum Plumbi Acetatis*, L. *Liquor Plumbi diacetatis*, L.

LIQUOR PLUMBI DIACETATIS, Lond. *Solution of Diacetate of Lead.*[1]

"Take of acetate of lead, *two pounds and three ounces;* oxide of lead, rubbed to powder, *one pound and four ounces;* distilled water, *six pints.* Boil them for half an hour, assiduously stirring; and when the solution is cold, add as much distilled water as is sufficient to measure with it six pints. Lastly, strain the solution."

PLUMBI SUBACETATIS LIQUOR, Dub. *Solution of Subacetate of Lead.*

"Take of semivitreous oxide of lead, *one part;* distilled vinegar, *twelve parts.* Put them into a glass vessel, and boil, assiduously stirring until eleven parts only of the fluid remain; then set the solution aside, and strain it after the fæces have subsided."

Syn. Acetate de Plomb liquide (*F.*), Blaiwasser (*G.*), Aceto di Saturno (*I.*).

In the process of the London College, the acetate yields up a portion of its acid to the oxide of lead, by which means it becomes a diacetate. The proportion of litharge ordered in the Dublin formula is too large, a gallon of distilled vinegar of the specific gravity 1·007 being capable of dissolving ten ounces only of the oxide; but the preparation varies according to the strength of the vinegar.

Qualities. — This solution of diacetate of lead, when properly prepared, is of a pale straw colour, has a slight acetous odour, and an austere, somewhat sweetish taste. It is partially decomposed when largely diluted with distilled water; and with pump water a heavy precipitate instantly takes places: it is also precipitated in the form of a white subsalt by the alkalies and their carbonates; and a black precipitate is produced by sulphuretted hydrogen and the alkaline sulphurets.

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[1] *Aqua lythargyri acetati*, P. L. 1787. *Liquor Plumbi acetatis*, P. L. 1809. *Liquor Plumbi subacetatis*, P. L. 1824.

It is, indeed, the best test for detecting sulphuretted hydrogen in any compound. The quantity of sulphur is always $\frac{2}{15}$ of the sulphuret of lead, to which, if we add $\frac{1}{15}$, we obtain the weight of the sulphuretted hydrogen. This solution is also incompatible with solutions of mucilage of gum, which it coagulates; and, indeed, it is the most delicate test for mucilage with which we are acquainted. According to the experiments of Dr. Bostock[1], the constituents of 100 parts of the saturated solution are 23·1 of oxide of lead, 5 of acetic acid, and 71·9 of water, which agree with the statement of Thénard[2], who found that the salt, when crystallized, consists of 17 parts of acid, 78 of oxide of lead, and 5 of water, in 100 parts.[3] In equivalents, it consists of 1 eq. of acetic acid $=$ $51{\cdot}48 + 2$ eq. of protoxide of lead $= 222{\cdot}12$; making the equivalent 273·60. ($Pb^2 \bar{A}$.)

Medical properties and uses.—This solution is used only externally, and when diluted with *distilled* water forms a very useful, cooling, discutient application to phlegmonous inflammations and burns. It was introduced into practice by M. Goulard, a surgeon of Montpelier; and thence its appellation of Goulard's Extract.

LIQUOR PLUMBI DIACETATIS DILUTUS, Lond. *Diluted Solution of Diacetate of Lead.*[4]

"Take solution of diacetate of lead, *a fluid drachm and a half;* distilled water, *a pint;* proof spirit, *two fluid drachms.* Mix."

PLUMBI SUBACETATIS LIQUOR COMPOSITUS, Dub. *Compound Solution of Litharge.*

The same as the London formula, with double the quantity of each of the ingredients.

This preparation, as an article in the Pharmacopœia, is superfluous, every surgeon being in the habit of ordering lotions with different proportions of the solution of diacetate of lead, according to the circumstances of the case.

PLUMBI CHLORIDUM, Lond. *Chloride of Lead.*

"Take of acetate of lead, *nineteen ounces;* boiling dis-

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1 *Nicholson's Journal*, xi. 75.

2 *Nicholson's Journal*, vi. 223.

3 The nature of the salt in this solution was first pointed out by Scheele, who changed a solution of the acetate of lead into Goulard's extract, by keeping it in a plate of lead for the space of a day; but this experiment was overlooked until Dr. Bostock's analysis of the preparation. An excellent mode of preparing it is employed in the French hospitals. Three parts of acetate of lead are dissolved in a sufficient quantity of hot distilled water, and to the solution one part of semi-vitreous oxide of lead is added, in fine powder. The whole is then evaporated until it marks 28° of Beaumé's aërometer; and when cold, is filtered. Vide *Journ. de Pharm.* Dec. 1816, p. 565.

4 *Aqua lithargyri acetati composita*, P. L. 1787. *Liquor Plumbi subacetatis*, P. L. 1824.

tilled water, *three pints;* chloride of sodium, *six ounces.* Dissolve the acetate of lead and chloride of sodium separately; the former in three pints (namely, the whole) of the distilled water. The liquors being then mixed together, wash what is precipitated with distilled water, when it is cold, and dry it."

The acetate of lead and the chloride of sodium are reciprocally decomposed in this process; the acetate of lead parts both with its acid and the oxygen of its oxide: the oxygen uniting with the sodium forms soda, which combines with the acetic acid, whilst the freed chlorine combines with the lead, and forms the chloride.

Qualities. — Chloride of lead is a colourless, fusible salt, soluble in 30 parts of water at 60°, and in 22 at 212°. The latter solution, as it cools, crystallizes in flat, anhydrous crystals, which have generally much brilliancy. Its solubility is augmented by adding a little nitric acid to the water. Its solution is decomposed by the alkalies and their carbonates; and by vegetable astringent infusions and decoctions. It is a compound of 74·3 parts of lead and 25·7 of chlorine in 100 parts; or of 1 eq. of chlorine $=35{\cdot}42+1$ of lead $=103{\cdot}6$, making the equivalent 139·02. (Pb Cl.)

It is merely used for preparing hydrochlorate of morphia.

PLUMBI IODIDUM, Lond. *Iodide of Lead.*

"Take of acetate of lead, *nine ounces;* iodide of potassium, *seven ounces;* distilled water, *one gallon.* Dissolve the acetate of lead in six pints of the water, and filter; add to the solution the iodide of potassium dissolved in two pints of the water. Wash what is precipitated, and dry it."

The exchange in this process is reciprocal: the oxygen of the oxide of lead of the acetate passes to the potassium, forming it into potassa, which, uniting with the acetic acid, produces an acetate of potassa, whilst the lead thus freed combines with iodine, also set free, and forms the iodide, which being nearly insoluble in cold water, is precipitated and readily separated from the soluble acetate.

Qualities. — The iodide of lead is a bright golden-yellow coloured powder, when procured by the above process. It is scarcely soluble in water at 60°, but it dissolves readily when boiled in distilled water, and deposits, on cooling, brilliant golden-coloured crystalline scales. It dissolves in solution of pure potassa. It is decomposed by heat, the iodine being dissipated in vapour, and metallic lead left. It is a compound of 1 eq. of lead $=103{\cdot}6+1$ of iodine $=126{\cdot}3$, making the equivalent $=229{\cdot}9$. (Pb I.)

Medical properties and uses. — This iodide operates as a deobstruent in glandular obstructions; and, according to

Velpeau, it has removed indolent scrofulous tumours, when iodine and its other compounds have failed. I have had no experience of its value as an internal medicine; but as an external application in aid of the other compounds of iodine internally administered, I have had ample opportunity of ascertaining its efficacy in discussing indolent tumours. I have generally ordered a stronger ointment than that of the Pharmacopœia, namely, ʒjss. of the iodide to ℥j. of lard. The dose of the iodide for internal use is gr. ½ to grs. iv.

PLUMBI OXYDUM HYDRATUM, Lond. *Hydrate of the Oxide of Lead.*

"Take of solution of diacetate of lead, *six pints;* distilled water, *three gallons;* solution of potassa, *six pints, or as much as may be required to precipitate the oxide.* Mix, and wash the precipitate with water, until nothing alkaline remains."

The oxide in precipitating combines with water, and is thus constituted an insoluble hydrate, whilst the acetate of potassa remains in solution.

Qualities.—Hydrate of oxide of lead is a white powder, insipid and inodorous. As it is soluble in an excess of potassa, it is important, in preparing it, not to employ too much of the alkaline solution. The constituents of the salt are 1 eq. of lead $=103{\cdot}6+1$ of oxygen $=8$, making the equivalent $=111{\cdot}6$ (Pb O.) The quantity of water has not yet been determined.

This hydrate is intended for preparing the disulphate of quina.

PRÆPARATA E STANNO.

PREPARATIONS OF TIN.

STANNI PULVIS, Dub. *Powder of Tin.*

"Take of tin, *any quantity.* Melt it over the fire in an iron mortar, and stir it while it is cooling, until it become a powder, which, when cold, is to be passed through a sieve."

Syn. Poudre d'Etain (*F.*), Zinn (*G.*), Stagno in polvere (*I.*).

By this process the tin is reduced to the form of a fine granular powder, and, perhaps, by the constant stirring, it is also very slightly oxidized, for the powder has less brilliancy than the entire metal.

Medical properties and uses.—Powder of tin is a mechanical anthelmintic. It has been chiefly given to expel the tape-worm; and is supposed to operate by the grittiness of its particles irritating the worm, and dislodging it from the mucus in which it is imbedded. It is given in doses of ʒ j. or ʒ ij. mixed in treacle, for two or three successive mornings, followed by a brisk cathartic. The oil of turpentine has superseded its use for the expulsion of tape-worm.

PRÆPARATA E ZINCO.

PREPARATIONS OF ZINC.

CALAMINA PRÆPARATA, Lond. *Prepared Calamine.*

"Calcine the calamine, and beat it to powder; then bring it into the state of a very fine powder, in the manner directed for the preparation of chalk."

CARBONAS ZINCI IMPURUS PRÆPARATUS, Edin. *Prepared impure Carbonate of Zinc.*

"Impure carbonate of zinc, roasted by those who make brass, being rubbed to powder in an iron mortar, and levigated with a little water on a porphyry, is to be put into a large vessel, and water poured over it, which, after frequently agitating the vessel, is to be poured off loaded with the powder. The fine powder, which subsides after the water has remained at rest, is then to be dried. The coarse, which the water cannot suspend, is to be again levigated, and treated as before."

ZINCI CARBONAS IMPURUM PRÆPARATUM, Dub. *Prepared impure Carbonate of Zinc.*

"Reduce calcined calamine stone to powder, and separate the very fine parts in manner directed for the preparation of chalk."

Syn. Calamine preparé (*F.*), Galmei (*G.*), Kalmei (*Dutch*), Galmija (*Russ.*), Calamina (*I.*), Calamina (*S.*).

The nature of this ore of zinc has been already stated (Part II.). As it is frequently used in the form of a dry powder to excoriations, ichorous ulcers, and superficial inflammations, dusted on the part, it requires to be rendered extremely fine.

Officinal preparations.— *Ceratum Calaminæ*, E. *Unguentum Calaminaris,* D.

OXIDUM ZINCI IMPURUM PRÆPARATUM, Edin. *Prepared impure Oxide of Zinc.*

"It is prepared in the same manner as the impure carbonate of zinc."

This substance, the nature of which has been already stated (Part II.), is used for the same purposes as the former article.

ZINCI OXYDUM, Lond. *Oxide of Zinc.*[1]

"Take of sulphate of zinc, *one pound;* sesquicarbonate of ammonia, *six ounces and a half;* distilled water, *three gallons* Dissolve the sulphate of zinc and the sesquicarbonate of ammonia separately in twelve pints of the distilled water, then mix them together. Wash the precipitate repeatedly with distilled water, and burn it for two hours in a strong fire."

OXIDUM ZINCI, Edin. *Oxide of Zinc.*

"Let a large crucible be placed in a furnace filled with burning coals, in such a manner as to be somewhat inclined to its mouth; and when the bottom of it is heated to a moderate degree of redness, throw into it a piece of zinc, about the weight of one drachm. The zinc is soon inflamed, and converted into white flocculi, which are occasionally to be removed from the surface of the metal by means of an iron spatula, that the combustion may be more complete; and when the inflammation is over, remove the oxide of zinc from the crucible. Throw in then another piece, and let the operation be repeated as often as is necessary. Finally, let the oxide of zinc be prepared in the same manner as the impure carbonate of zinc."

Dublin.

"Take of zinc broken into small pieces *any quantity.* Throw these, at intervals, into a sufficiently large crucible, heated to whiteness, and placed with its mouth inclined towards the mouth of the furnace. After each piece of zinc is thrown in, invert over the crucible another crucible, but loosely, so as not to exclude the air. Preserve the light, very white, sublimed powder for use.

Syn. Oxide de Zinc (*F.*), Weisser Zinkoxyd (*G.*), Perossido di Zinco; Fiori di Zinco (*I.*).

In the process of the London College, care should be taken not to add too much ammonia, as it redissolves the precipitate. In the first instance, the precipitate is a carbonate of zinc, from which the carbonic acid is expelled by the ignition. In the two other processes the crucible must be heated above

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[1] The ancients, who were acquainted with it, called it Pompholyx; and by the early chymists it was named *Nihil album, Lana philosophica,* and *Flores Zinci.* Zincum calcinatum, P. L. 1787. In Holland it was prepared as a secret remedy and sold under the names, *ArcanumLudemanni* and *Luna fixata,* until Gaubius made public its composition.

700° of Fahrenheit, which is the point of ignition of zinc. At this temperature the metal inflames, burning with a dazzling white and green flame; and by attracting the oxygen of the air it is converted into a white oxide, which is partly volatilized in the form of very light flocculi. The elevation of these flocculi, however, is owing to the current of air excited by the force of the combustion; for the oxide itself is not volatile, but accumulates in the crucible so rapidly, that it must be withdrawn to allow the access of the air for keeping up the combustion. If the crucible be sufficiently capacious, there is no necessity for covering it with another, by which the operation is always impeded.[1]

Qualities. — Protoxide of zinc thus prepared is inodorous, insipid, of a pure white colour, infusible in the fire, insoluble in water and alcohol, entirely soluble in acids, and in the alkalies: it is not soluble in the carbonates of the alkalies; nor is it altered by exposure to the air. According to Proust 100 parts of it consist of 80 of zinc, and 20 of oxygen; or 100 zinc + 25 oxygen; or of 1 eq. of zinc 32.3 + 1 of oxygen 8; making the equivalent 40·3 ($\dot{Zn}$.) It often contains small portions of carbonic acid.[2] It is often adulterated with chalk, and sometimes contains white lead. By pouring sulphuric acid on the specimen, the first is discovered by the effervescence which is excited, the second by an insoluble sulphate of lead being formed.

Medical properties and uses. — Oxide of zinc is tonic and antispasmodic; and has been advantageously used in chorea, epilepsy[3], and some other spasmodic affections. It has been employed in hooping-cough on the Continent; and Lœffler recommends it to be used externally as well as internally in that disease. He employs a liniment, composed of linseed oil and oxide of zinc. It is chiefly used as an external application. (See *Ung. Zinci.*)

The dose, as an internal remedy, may be from gr. j. to grs. vj., given twice a day.

Officinal preparation. — *Ungentum Zinci*, L. E. D.

ZINCI SULPHAS[4], Lond. *Sulphate of Zinc.*

"Take of zinc, in small pieces, *five ounces*; diluted sulphuric acid, *two pints*. Pour gradually the diluted sulphuric acid

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1 This oxide may also be readily prepared by dissolving sulphate of zinc and precipitating by potassa, a process proposed by Marabelli, professor of pharmacy at Pavia, in 1798. The washed precipitate is oxide of Zinc, containing, according to Vauquelin, 0·21 of oxygen,

2 *Annales de Chimie*, xxxv. 51. The more recent experiments of Dr. Thomson make the proportions to be metal 100 + 24·16 oxygen: Those of Berzelius, metal 100+24·4 oxygen.

3 *Duncan's Med. Comment.* iii. 216.

4 Zincum vitriolatum, P. L. 1787.

upon the pieces of zinc, and the effervescence being finished, filter the solution; then boil it until a pellicle begin to form. Lastly, set it aside to crystallize."

Edinburgh.

"Take of zinc, cut into small pieces, *three parts;* sulphuric acid, *five parts;* water, *twenty parts.* Mix them, and the effervescence being finished, digest for a short time on hot sand. Then filter the decanted solution through paper, and after due evaporation, set it aside that crystals may be formed."

Dublin.

"Take of zinc, reduced to small pieces, *thirteen parts;* sulphuric acid, *twenty parts;* water, *one hundred and twenty parts.* Pour the acid, previously diluted with the water, upon the zinc; put into a glass vessel; digest for a short time after the effervescence ceases; then evaporate the strained solution to a proper point, and set it aside to crystallize."

Syn. Sulphate de Zinc (*F.*), Schwefelsaures Zink (*G.*), Solfato di Zinco (*I.*). Vitriolo bianco (*S.*).

The directions of the Dublin College for granulating the zinc are to be adopted in preference to those of the other colleges for dividing it. In these processes, the acid enables the zinc to decompose the water, and the metal is oxidized by attracting its oxygen, while its hydrogen is disengaged with effervescence. The oxide thus formed combines with the acid, forming sulphate of zinc, which is obtained in crystals by the subsequent evaporation. The greater part, however, of the sulphate of zinc of the shops is prepared on a large scale, and purified in the manner that shall be immediately noticed. It is denominated *white vitriol* in the language of commerce, and is manufactured largely both in Germany[1] and England. In Germany it is prepared by exposing roasted blende to the air and humidity; by which means the metal is gradually oxidized, and combined with the sulphuric acid also formed from the sulphur contained in the blende. The sulphate thus produced is separated from the earthy parts of the blende by lixiviation; and after being boiled down it is crystallized, or rather concreted, into granular masses, resembling loaf-sugar; which generally contain sulphate of iron, of lead, and of copper. In England it is prepared generally by the direct combination of its constituents; but although purer than the foreign salt, yet the English sulphate almost always contains iron. Both kinds are purified by solution in water, and then

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1 Beckman, in his History of Inventions, says, it was first made at Ramelsberg, in Germany, about the middle of the 16th century. He ascribes the invention to Julius, Duke of Brunswick.

allowing the solution to evaporate very slowly in an open vessel, containing some granulated zinc; the sulphate of lead will subside, and the other foreign salts be decomposed by the metallic zinc. The purified sulphate of zinc may be then crystallized by lixiviation and evaporation.[1]

Qualities. — Pure sulphate of zinc is inodorous, colourless, and has a slightly acidulous, styptic, metallic taste. It crystallizes in transparent, right rhombic prisms[2], terminated by quadrangular pyramids; it effloresces slightly in the air; is soluble in 2·5 times its weight of water at 60°, and in less than its own weight of boiling water. It is decomposed by the alkalies, earths, and hydrosulphurets: and throws down a dirty-looking precipitate from astringent vegetable infusions, with which, therefore, it is incompatible in prescriptions. According to the analysis of Dr. Wollaston, the constituents of 100 parts of the pure crystallized salt are 28·4 of oxide of zinc, 27·3 of acid, and 44·3 of water: or 1 eq. of protoxide of zinc = 40·3 + 1 of sulphuric acid = 40·1 + 7 of water = 63; making the equivalent 144·4. ($\dot{Zn}\dddot{S}$.)

Medical properties and uses. — Sulphate of zinc is tonic and astringent, and in large doses emetic. As a tonic, it is less heating and stimulant than sulphate of iron; and thence is preferable in phthisis, and other diseases attended with great irritability and general weakness. It is also useful in dyspepsia, fluor albus, and some convulsive affections, as pertussis, chorea, and epilepsy; in which diseases it is generally combined with myrrh, bitter extracts, opium, extract of hemlock, or digitalis, according to the circumstances of the case. As an emetic it operates almost instantaneously, and, therefore, is often employed to empty the stomach at the commencement of the paroxysm of intermittent fever, and in other cases in which quick vomiting is required. In large doses it is poisonous.[3] As an external application, this salt dissolved in rose-water, in the proportion of gr. iss. to f ℥ j of rose-water, forms an excellent collyrium in the latter stage of ophthalmia, after the inflammatory action has subsided; it is a good injection in gonorrhœa; and a lotion in some kinds of superficial inflammations. The solution, double the strength, is the best application that can be used to scrofulous tumours, after they have suppurated, and the abscess has been discharged.

The dose to produce vomiting, is from grs. x. to ʒ ss., and as a tonic from gr. j. to grs. ij. may be given twice a day.

Officinal preparations. — *Solutio Sulphatis Zinci,* E. *Liquor Aluminis compositus,* L. *Solutio Acetatis Zinci,* E. D.

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[1] *Aikin's Dictionary of Chemistry.* [2] *Phillips's Trans. of the Pharm.* 1824.

[3] It is a singular fact, that the Aranea *scenica* devours sulphate of zinc, and deprives it of its acid.

SOLUTIO SULPHATIS ZINCI, Edin. *Solution of Sulphate of Zinc.*

"Take of sulphate of zinc, *sixteen grains;* water, *eight ounces;* diluted sulphuric acid, *sixteen drops.* Dissolve the sulphate of zinc in the water, and having added the acid, filter the solution through paper."

This formula is given under the idea of the common sulphate of zinc (which often contains some excess of oxide, and some oxide of iron) being employed. The superabundant oxide, if present, is dissolved by the acid, so that a solution of an uniform strength is always obtained. It is rather too strong for the purposes of a collyrium in chronic ophthalmia; and the addition of the acid renders it less fit to be used as an injection in gonorrhœa.

SOLUTIO ACETATIS ZINCI, Edin. *Solution of Acetate of Zinc.*

"Take of sulphate of zinc, *one drachm;* acetate of lead, *four scruples;* distilled water, *twenty ounces.* Dissolve. Mix the salts separately in ten ounces of the water; then mix the olutions, and after the precipitate subsides, filter."

Syn. Dissolution d' Acetate de Zinc (*F.*), Liquore de l' Acetto di Zinco (*I.*).

In this process a double decomposition takes place: the sulphuric acid of the sulphate of zinc unites with the oxide of the acetate of lead, whilst its acid combines with the disengaged oxide of zinc. The former salt being insoluble it is precipitated in the form of a heavy, white powder, but the acetate of zinc remains dissolved; and thus its solution, which is colourless and limpid, is easily separated by filtration; it consists of 1 eq. of the oxide of zinc $=40{\cdot}3+1$ of acetic acid $=51{\cdot}48+7$ of water $=63$; making the equivalent $154{\cdot}78$ ($\dot{Zn}\,\bar{A}$).

Medical properties and uses. — This solution is astringent; and was long employed before it was introduced into the Pharmacopœia, and even before its nature was clearly understood. It is an useful collyrium in chronic ophthalmia, and in the acute variety of this disease, after the inflamed vessels are unloaded, and the inflammatory action subdued. It is also an useful injection in the advanced stage of gonorrhœa.

TINCTURA ACETATIS ZINCI, Dub. *Tincture of Acetate of Zinc.*

"Take of sulphate of zinc, acetate of potassa, of each *one part.* Rub them together, and add of rectified spirit of wine, *sixteen parts.* Macerate for a week, with occasional agitation, and filter through paper."

In this process, a double decomposition also takes place, acetate of zinc and sulphate of potassa being produced; the former of which is dissolved in the spirit, while the latter remains undissolved, and, therefore, is easily separated. It is a tedious process, and possesses no advantages over the former to recommend it.

Medical properties and uses. — This tincture is astringent; but requires to be diluted with water, before it can be used either as a collyrium or an injection. It might be advantageously employed as an internal remedy in dyspepsia, and other debilities of the stomach.

MISTURÆ.

MIXTURES.

THE term mixture in pharmaceutical language denotes a mingled compound, in which different ingredients are held suspended in a fluid medium by means of mucilaginous or of saccharine matter. The London College has placed under this title those medicines, also, which consist of the fixed oil of seeds diffused through water by means of the mucilage, fecula, or saccharine matter of the seeds, and which are denominated *emulsions.* Both these kinds of preparations should always be extemporaneous; and in prescribing them attention is required not to bring together incompatible substances, nor to order in mixtures insoluble matters of a specific gravity too great to be suspended, in the fluid vehicle, by the ordinary means.

MISTURA ACACIÆ, L.[1] *Mixture of Acacia.*

"Take of acacia, powdered, *ten ounces;* boiling water, *a pint.* Rub the acacia with the water gradually poured in, and dissolve it."

MUCILAGO ACACIÆ ARABICÆ[2], Edin. *Mucilage of Gum Arabic.*

"Take of gum arabic, in powder, *one part;* boiling water, *two parts.* Digest with occasional agitation until the gum be dissolved; then strain the mucilage through linen."

MUCILAGO GUMMI ARABICI, Dub. *Mucilage of Gum Arabic.*

"Take of gum arabic, in coarse powder, *four ounces;* boiling water, *eight ounces.* Digest with frequent agitation, until the gum be dissolved; then strain the mucilage through linen."

Syn. Mucilage de Gomme Arabique (*F.*), Schlieim de Arabiche Gummi (*G.*) Mucilagine de Gomma Arabica (*I.*).

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[1] Mucilago Acaciæ. P. L. 1809. 1824.

[2] This appellation is certainly exceptionable. It is a mucilage of gum of the *Acacia vera.*

The straining through linen is very necessary, as the gum is often mixed with small pieces of wood and other impurities. The mucilage thus obtained is viscid, thick, and adhesive; semipellucid, and nearly colourless, if the gum be good. It has a faint, peculiar odour, is insipid, and may be kept without altering for a considerable time; but at length it becomes sour, and acetic acid is formed. The strong acids act on it as they do on gum; but when diluted, they do not alter mucilage. Alcohol converts it into a white curd; but proof spirit produces scarcely any alteration; no change is produced by spirit of nitric æther; but sulphuric æther and compound spirit of æther precipitate a thick, white, tenacious curd. Tincture of sesquichloride of iron, even when diluted, converts mucilage into a brownish or orange-coloured, insoluble jelly; and diacetate of lead gives a copious, dense, flaky precipitate, which is a compound of gum and oxide of lead; while no change is produced by the solution of the following metallic substances: — acetate of lead, green sulphate of iron, sulphate of zinc, bichloride of mercury, and tartarised antimony; nor by the alkalies or the neutral salts. Mucilage, like gum, serves to combine resins, oils, and balsams with water, for which purpose, and to give tenacity to pills, it is much employed in pharmacy.

Medical properties and uses. — The properties of mucilage are the same as those of gum. (See Part ii.) It is the usual basis of demulcent mixtures for allaying the tickling, which excites cough, in catarrh, and phthisis[1]; and, combined with opium and other narcotics, it is useful in diarrhœa, dysentery, calculous affections, and ardor urinæ. The dose of mucilage may be from f ℥ss. to f ℥j., frequently repeated.

Officinal preparations. — *Mistura Guaiaci*, L. *Potio Carbonatis Calcis*, E.

MISTURA AMYGDALÆ, L. *Almond Mixture.*

"Take of confection of almond, *two ounces and a half;* distilled water, *a pint.* Add the water to the confection of almond gradually, while rubbing them, until they are mixed; afterwards strain through linen."

EMULSIO AMYGDALI COMMUNIS, Edin. *Almond Emulsion.*

"Take of sweet almonds, *an ounce;* refined sugar, *half an ounce;* water, *two pounds and a half.* Beat diligently the blanched almonds in a stone mortar, adding the water gradually; then strain."

MISTURA AMYGDALARUM, Dub. *Mixture of Almonds.*

"Take of sweet almonds, blanched, *an ounce and a half;*

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[1] ℞ Mucilaginis Acaciæ f ℥j. Olei Amygdalarum, Syrupi Papaveris Albi, āā f ℥ss., Aquæ f ℥iv., Acidi Citrici, q. s. ad gratam acidulat. M. ut fiat mistura cujus sumat æger cochl. med. unum subinde.

purified sugar, *half an ounce;* water, *two pints and a half.* Rub the almonds with the sugar, adding the water gradually; then strain."

EMULSIO ACACIÆ ARABICÆ, Edin. *Emulsion of Gum Arabic.*

"Take of mucilage of gum arabic, *two ounces;* almonds, *an ounce;* refined sugar, *half an ounce;* water, *two pounds and a half.* Blanch the almonds, and then beat them in a stone mortar with the sugar and the mucilage, gradually adding the water; then strain through linen."

EMULSIO ARABICA, Dub. *Arabic Emulsion.*

"Take of gum arabic, in powder, *two drachms;* sweet almonds, blanched, purified sugar, of each *half an ounce;* decoction of barley, *a pint.* Dissolve the gum in the warm decoction; and when it is almost cold, pour it gradually upon the almonds previously beaten to a paste with the sugar, triturating at the same time so as to form a milky mixture; then strain."

Syn. Emulsion d' Amandes (*F.*), Mandelmilch (*G.*), Latte di Mandorle (*I.*).

In these preparations the oil of almonds is diffused through the water, and suspended in it by the mucilage and fecula which the almonds contain; the gum in the two latter preparations contributing nothing to this effect. The confection ordered by the London College affords an expeditious mode of making the mixture. The use of distilled water is an unnecessary refinement. Bitter almonds are sometimes employed instead of sweet; and as the hydrocyanic acid is evolved in the bitter almond, this is a direct sedative, and is certainly a better vehicle for squills and other expectorant remedies than that of the sweet almond. In some habits, however, owing to idiosyncracy, the bitter almonds cannot be administered without producing an eruption on the skin, and otherwise disordering the system.

Qualities. — These emulsions are inodorous, bland, milky fluids. The oil, after some time, rises like a thick cream to the surface; and in forty-eight hours the acetous fermentation commences, and the mixtures become sour. They are decomposed by acids, oxymel of squills, spirits, and tinctures (unless these be in small quantity), tartrate and bitartrate of potassa, bisulphate of potassa, nitrate of potassa, acetate and diacetate of lead, and spirit of nitric æther, which are therefore incompatible in prescriptions with almond emulsions. A small quantity of bichloride of mercury prevents the emulsion from spoiling.

Medical properties and uses. — These mixtures are in common use as diluents and demulcents in inflammatory fevers, strangury, dysury, and other affections of the urinary organs;

but they are chiefly useful as pleasant vehicles for the exhibition of more active remedies. The dose is from f ℥ ij. to O ss., frequently repeated.

MISTURA AMMONIACI, Lond. *Mixture of Ammoniacum.*

"Take of ammoniacum, *two drachms;* water, *half a pint.* Triturate the ammoniacum, gradually adding the water, until they be thoroughly mixed."

Dublin.

"Take of gum ammoniacum *a drachm;* pennyroyal water, *eight fluid ounces.* Triturate the gum, gradually adding the pennyroyal water, until the mixture acquire the appearance of milk, which is to be strained through linen."

The resinous part of the ammoniacum is suspended in the water by means of the gummy part; but after a little time the greater portion of the resin subsides. It is coagulated by distilled vinegar, the oxymels, æther, spirit of nitric æther, bitartrate of potassa, and bichloride of mercury, which are therefore incompatible in prescriptions with mixture of ammoniacum. It is advantageously employed as an expectorant in doses of from f ℥ss. to f ℥j., combined with an equal quantity of almond mixture.

MISTURA ASSAFŒTIDÆ, Lond. *Mixture of Assafœtida.*

"Take of assafœtida, *five drachms;* water, *a pint.* Triturate the assafœtida, gradually adding the water to it, until they be thoroughly mixed."

Dublin.

"Take of assafœtida, *a drachm;* pennyroyal water, *eight fluid ounces.* Triturate the assafœtida, gradually adding the water until it form an emulsion."

Owing to the disagreeable flavour of assafœtida, this mixture is seldom given by the mouth in this form: it is chiefly employed as an enema in flatulent colic, worms, and the convulsions of infants arising from irritations of the bowels during dentition. When given by the mouth the dose may be from f ℥ss. to f ℥jss., frequently repeated.

MISTURA CAMPHORÆ, Lond. *Mixture of Camphor.*

"Take of camphor, *half a drachm;* rectified spirit, *ten minims;* water, *a pint.* Rub the camphor first with the spirit, then add the water gradually, and strain through linen."

Dublin.

"Take of camphor, *a scruple;* rectified spirit of wine, *ten drops;* refined sugar, *half an ounce;* water, *a pint.* Rub the camphor first with the spirit, and then with the sugar; add the water during the trituration, and strain the mixture through linen."

MISTURA CAMPHORÆ CUM MAGNESIA, Dub. *Mixture of Camphor with Magnesia.*

"Take of camphor, *twelve grains;* carbonate of magnesia, *half a drachm;* water, *six ounces.* Rub the camphor with the magnesia: add the water gradually, and mix."

Syn. Mixture Camphré (*F.*), Kampfermixtur (*G.*), Mistura Canforata (*I.*).

A pint of water takes up less than one half the quantity of camphor ordered by the London College: but the camphor communicates both odour and taste to the water in a considerable degree: it is rendered more soluble by the magnesia. Solution of pure potassa separates the camphor. Camphor mixture is an elegant vehicle for more active remedies in low fevers and nervous affections; but cannot be regarded as acting on the habit from the quantity of camphor it contains. The dose is from f ℥ j. to f ℥ ij., given every three or four hours.

EMULSIO CAMPHORÆ, Edin. *Camphor Emulsion.*

"Take of camphor, *a scruple;* sweet almonds, blanched, refined sugar, each *half an ounce;* water, *a pint and a half.* It is to be made in the same manner as the common almond emulsion."

In this preparation the whole of the camphor is diffused through the mixture; the medicinal powers of which are consequently more considerable than those of the foregoing preparation. It is less apt to excite nausea and uneasiness at the stomach than camphor in powder, and is given with advantage in typhus and nervous cases, in doses of f ℥ ij. every three or four hours. Its preparation should always be extemporaneous, as the camphor separates and swims on the surface of the mixture after a few days.

MISTURA CASCARILLÆ COMPOSITA, L. *Compound Mixture of Cascarilla.*

"Take of infusion of cascarilla, *seventeen fluid ounces;* vinegar of squill, *a fluid ounce;* compound tincture of camphor, *two fluid ounces.* Mix."

This is intended to combine an expectorant with a tonic; but it can only be useful in old asthmatic or bronchitic affections, where stimulants are not objectionable. The dose is f ℥jss. to f ℥ij., twice a day.

MISTURA CRETÆ, Lond. Dub. *Mixture of Chalk.*

"Take of prepared chalk, *half an ounce;* refined sugar *three drachms;* mixture of acacia, *a fluid ounce and a half;* (acacia powder, *an ounce*, Dub.); cinnamon water, *a pint.* Mix."

POTIO CARBONATIS CALCIS, Edin. *Chalk Potion.*

"Take of prepared carbonate of lime (chalk), *one ounce;* refined sugar, *half an ounce;* mucilage of gum arabic, *two ounces.* Rub them together, and then gradually add, of water, *two pounds and a half;* spirit of cinnamon, *two ounces.* Mix them."

These are common and useful forms of giving chalk in acidity of the primæ viæ: and, combined with opium or catechu, in diarrhœa. The dose is from f ℥j. to f ℥ij. given every three or four hours; or after every liquid evacuation.

MISTURA FERRI COMPOSITA, Lond.[1] Dub. *Compound Mixture of Iron.*

"Take of Myrrh, in powder, *two drachms;* carbonate of potassa, *a drachm;* rose-water, *eighteen fluid ounces;* sulphate of iron, in powder, *two scruples and a half;* spirit of nutmeg, *a fluid ounce;* sugar, *two drachms.* Rub together the myrrh, the carbonate of potassa, and the spirit of nutmeg; and, while triturating, add first the rose-water with the sugar, then the sulphate of iron. Put the mixture immediately into a proper glass vessel, and stop it."

In this mixture the sulphate of iron is decomposed by the carbonate of potassa forming, by the change of constituents which takes place, sulphate of potassa and sesquioxide of iron mixed with a protocarbonate; the former of which is dissolved, while the latter is diffused through the mixture, and kept suspended by the myrrh, which forms a saponaceo-mucilaginous compound with the excess of alkali. The iron, which is in the state of a protocarbonate, rapidly attracts oxygen while the vessel is opened, and loses its carbonic acid, being wholly converted into the sesquioxide, which is insoluble, and, consequently, it is necessary to keep the mixture very well excluded from the air; or rather, it should not be kept prepared.

Medical properties and uses.—This mixture, which is nearly the same as the celebrated antihectic mixture of Dr. Griffith, is a useful tonic in all cases in which preparations of iron are indicated, particularly in hysteria and chlorosis, and in phthisis, when no active inflammatory diathesis subsists. The dose is from f ℥j. to f ℥ij. given two or three times in a day.

MISTURA FERRI AROMATICA, Dub. *Aromatic Mixture of Iron.*

"Take of the bark of cinchona lancifolia, reduced to a coarse powder, *one ounce;* bruised calumba root, *three drachms;* bruised cloves, *two drachms;* iron filings, *half an ounce.* Digest in a close vessel for three days, agitating frequently with as

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[1] This name is certainly improper; but it is not easy to invent one which would be descriptive of the compound, and yet be sufficiently concise: *mistura subcarbonatis ferri cum myrrha* would have been less objectionable.

much peppermint-water as will yield twelve ounces of strained fluid; then add, of compound tincture of cardamoms, *three ounces;* and tincture of orange-peel, *three drachms.*"

If the iron is of any value here, it must exist in the state of a gallate and kinate. The mixture was originally employed under the name of Heberden's Ink, Atramentum Heberdenii. It appears to me to be a very unnecessary admixture of bitters and aromatics.

MISTURA GENTIANÆ COMPOSITA, L. *Compound Mixture of Gentian.*

"Take of compound infusion of gentian, *twelve fluid ounces;* compound infusion of senna, *six fluid ounces;* compound tincture of cardamoms, *two fluid ounces.* Mix."

This combination is useful in atonic dyspepsia, in which the bowels generally require assistance; but a permanent formula of this kind is unnecessary, as the quantity of the purgative requires to be varied according to circumstances. Dose, f ℥j. to f ℥ij., or more.

MISTURA GUAIACI, Lond. *Mixture of Guaiacum.*

"Take of guaiacum, *three drachms;* sugar, *half an ounce;* mixture of acacia gum, *half a fluid ounce;* cinnamon-water, *nineteen fluid ounces.* Rub the guaiacum with the sugar, then with the mixture of acacia, and, during the trituration, add gradually the cinnamon water."

This is a convenient mode of exhibiting guaiacum. It is given in doses of from f ℥ss. to f ℥ij., two or three times a day; diluting freely, with tepid barley-water or gruel to assist its operation.

MISTURA MOSCHI, Lond. *Mixture of Musk.*

"Take of musk, acacia powder, sugar, of each *three drachms;* rose-water, *a pint.* Rub the musk with the sugar, then with the acacia, and add, gradually, the rose-water."

Syn. Mixture avec le Musc (*F.*), Mistura Muschiato (*I.*).

The quantity of gum ordered is scarcely sufficient to retain the musk suspended in the mixture. It is a convenient form of exhibiting the remedy, and may be given to the extent of f ℥j. to f ℥ij., every three or four hours, in spasmodic affections, and the sinking state of typhus. The late Mr. White, of Manchester, found this mixture, combined with ammonia ʒss., spirit of lavender f ʒj., and spirit of juniper f ℥j., of great utility in sloughing phagedenic ulcers of a syphilitic and strumous nature.

MISTURA SPIRITUS VINI GALLICI, L. *Mixture of French Brandy.*

"Take of French brandy, cinnamon-water, each, *four fluid ounces;* the yolks of two eggs; refined sugar, *half an ounce;* oil of cinnamon, *two minims.* Mix."

This is undoubtedly one of the most agreeable preparations in the new Pharmacopœia; and, certainly, not one of the least useful. It is a pleasant and beneficial stimulant in the sinking stage of low fevers.

MUCILAGINES.

MUCILAGES.

MUCILAGES, correctly speaking, are simple solutions of gum or mucus in water: but the term mucilage, in pharmaceutical language, implies also any solution of a thick and adhesive nature, resembling in its appearance the solutions of gum.

MUCILAGO ASTRAGALI TRAGACANTHÆ, Edin. *Mucilage of Tragacanth.*

"Take of gum tragacanth, in powder, *two drachms;* boiling water, *eight ounces.* Macerate for twenty-four hours, and triturate the gum carefully, that it may be dissolved; then strain the mucilage through linen."

MUCILAGO GUMMI TRAGACANTHÆ, Dub. *Mucilage of Gum Tragacanth.*

"Take of gum tragacanth, in powder, *two drachms;* water, *eight fluid ounces.* Macerate in a covered vessel until the gum be dissolved, then strain the mucilage through linen."

Syn. Mucilage de Gomme Adraganthe (*F.*), Schlieim de Traganth (*G.*), Mucilagine di Gomma Adragante (*I.*).

Tragacanthe, treated in this manner, forms a thick, soft, very viscid mucilage, but the diffusion in the water, is not uniform; nor does it become so even when boiled. The water separates from the tragacanth, on standing; and this separation is increased, if mucilage of gum be mixed with the tragacanth. It may be used in the same cases as mucilage of gum arabic; and has been recommended by M. Blaire, a French surgeon, as a remedy in burns. He directs linen rags, or bibulous paper, soaked in the mucilage, to be applied over the affected part, which must be also kept moist with the mucilage for some days.[1] It is chiefly employed for making pills and troches.

MUCILAGO AMYLI, Edin. Dub. *Mucilage of Starch.*

"Take of starch, *three drachms;* water, *a pint.* Rub the starch, gradually adding the water to it; then boil till a mucilage be produced."

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[1] Vide *London Med. Repository,* vol. iii. p. 257.

Starch, thus treated, forms a strong, insipid, inodorous, opaline-coloured, gelatinous mucilage. In cases of phthisis, hectic fever, and abrasions of the stomach, it is given as a demulcent by the mouth; but it is more generally and more advantageously exhibited in the form of enema in diarrhœa, dysentery, and abrasions of the rectum. It is the common vehicle for exhibiting opium in the form of enema.

OLEA DISTILLATA.

DISTILLED, *or* VOLATILE OILS.

VOLATILE OILS, as they are properly denominated by the Edinburgh College, are vegetable products, found in almost every part of many plants, except the cotyledons of the seeds, in which, almost always, the fixed oils are contained. In some plants, the volatile oil exists in distinct vesicles, and is obtained by simple expression, but in general it can only be obtained by distillation; whence the name *distilled oils*, given to this class of substances by the London College: and as the odour of plants generally depends on their volatile oils, the Dublin College, following the example of the elder chymists, who denominated them essences, have adopted the term *essential oils.* The expressed volatile oils are now rejected from all the Pharmacopœias; and the whole of those used in pharmacy, retained, are procured by distillation.

Volatile oil is obtained from both recent and dried plants. When fresh plants are to be employed, they require no previous treatment; but when the plants are dry, or woods or barks are to be employed, the plants must be macerated in salt and water for some time, and the woods and barks be previously rasped. The distillation is performed in the following manner:—The plants, or the parts of them containing the oil, are to be put into a tinned copper still, and closely pressed down; after which, as much water is to be poured in as will be sufficient to cover the materials. The head of the still, which should be low, is then to be luted on; the fire lighted, and so regulated as to keep the contents of the still scarcely up to the boiling point; and the distillation should be continued, until the condensed vapour comes over nearly insipid and inodorous. During this process the volatile oil rises with the watery vapour, from which, however, the greater part of it again separates, after it has remained at rest for some hours in a cool place, and either floats on the surface of the water, or sinks to the bottom, according to its specific gravity. The complete separation of the oil is effected by an instrument called a Separator (see Part I.): and the water is to be again used for a second distillation of fresh materials, by which, as it is already impregnated with as much of the oil as it can dissolve, the product of oil of the second and every subsequent distillation will be consequently greater than that of the first; but it is not until "the tenth distillation, in some cases, that the product attains its maximum."[1] By the same process, volatile oils are obtained from balsams, resins, gum resins, and turpentines. They have not their characteristic qualities in perfection immediately after their distillation, but have a disagreeable, empyreumatic odour; to dissipate which they must be allowed to stand for some days in vessels loosely covered with paper, before they be put into the bottles in which they are to be preserved; which should be opaque.

Although all volatile oils agree in their chymical properties sufficiently to constitute them members of the same class of substances, yet they differ greatly in their qualities from each other, and in the proportions in which they are obtained.

Volatile oils have a penetrating odour, and hot taste. They are completely evaporated when heated in the open air; a property which is taken advantage of as a test of their purity: for if they be adulterated with fixed oil, which is not unfrequently the case, by heating a small portion of the oil on a piece of clean paper a greasy spot will remain, whereas, if the volatile oil be pure, the paper will be left perfectly clean. In a higher temperature, volatile oils are readily ignited, and burn with a bright white flame, emitting a large quantity of black dense smoke; and with the production of a large proportion of carbonic acid and water.

Volatile oils, exposed to the light, are deepened in colour, or become colourless: when exposed to the air they become more viscid, less odorous, redden the tincture of turnsole, and gradually assume the form of resins; which changes, Dr. Priestley ascertained[2] to depend upon the absorption of oxygen; and hence the necessity of preserving volatile oils in small phials, full, and well corked. An oil, which has become thick and scentless may be rectified by redistilling it with some of the same kind of plant from which it was originally extracted, or with alcohol or sulphuric æther[3]: a limpid, odorous oil comes over, and resin remains in the retort.

These oils are very sparingly soluble in water, rendering it milky when agitated with it: they communicate to it their

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[1] *Aikin's Dictionary of Chemistry*, art. *Oil.*
[2] *Priestley on Air*, ii. 232
[3] *Nicholson's Journal*, 8vo. vii. 6.

odour: they are all soluble in alcohol, æther, and the fixed oils in various proportions. From their solubility in alcohol they are sometimes adulterated with that fluid; but the fraud may be detected by agitating some of the suspected oil with water; when, if the oil contain alcohol, an increase of temperature will be indicated by the thermometer, but not if the oil be pure.[1] The more expensive oils are also occasionally adulterated with the cheaper, particularly with oil of turpentine, which, however, is readily discovered by its peculiar odour, if a piece of paper be dipped in the suspected oil and dried with a gentle heat. They are also, sometimes, adulterated with castor oil; and as the mixture, when the ingredients are in equal proportions, is soluble in alcohol, the fraud cannot be detected by that test; but it is rendered obvious by the adulterated oil leaving a greasy stain upon paper, which has been touched with it, and held before the fire, whereas no stain is left by the genuine oil.

Volatile oils unite with sulphur, in a temperature sufficient to melt the sulphur, and form brown-coloured, fetid mixtures, which have been denominated *balsams of sulphur*. The alkalies and earths combine imperfectly with them, and constitute a class of bodies, which the French chymists have denominated *savonules*. The action of the acids is much more violent on them than on the fixed oils: and several of them detonate when rubbed with *chlorate* of potassa.

As medical agents, volatile oils are stimulant and aromatic. They are chiefly employed to remove nausea and flatulence, to correct the griping qualities of some purgatives, and the disagreeable taste of other remedies. They may be given, triturated with water and mucilage; or dropped first on a lump of sugar, and through its medium diffused in water, forming a solution denominated *oleum saccharum*. The quantity of sugar must be more than ten times the weight of the oil; and when they are well triturated together, the oil becomes thus completely soluble in water, and may be diluted to any extent.

Some of the more stimulant of these oils are added to embrocations to be used as rubefacients, where counter-irritation is necessary.

The three British Colleges give the following general rules for the preparation of *volatile oils*:—

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[1] Marqueron, *Annales de Chimie*, xlviii. 267.

OLEA DISTILLATA, Lond.

Distilled Oils.

"The fruit of anise, carraway, and juniper, the flowers of chamomile, lavender, and elder, the berries of allspice, the tops of rosemary, and the entire recent plants of the other herbs are to be employed.

"Put any one of these into an alembic, then pour in as much water as will cover it, and distil the oil into a large vessel, kept cool."

OLEA VOLATILIA, Edin.

Volatile Oils.

"As much water only is to be employed as will prevent empyreuma during the distillation. The distillation may be immediately commenced after a proper maceration; and the oil afterwards separated from the water.

"It is also necessary to observe in preparing these oils, and the distilled waters, that the quality of the substances, their texture, the season of the year, and similar circumstances, must occasion so many differences, that it is scarcely possible to give any certain and general rules which shall strictly apply to every example. Many things, therefore, which must be regulated by the judgment of the operator, are omitted, and the more general only given."

Few of the volatile oils are prepared by the apothecary. The oils of anise, chamomile, juniper, origanum, rosemary, and pimento, are usually imported into this country; while those of lavender, peppermint, spearmint, and pennyroyal, are annually prepared on a large scale.

OLEUM ANISI, Lond. Dub. OLEUM VOLATILE PIMPINELLÆ ANISI, Edin. *Oil of Anise-seed,*

Syne. Huile d' Anis (*F.*), Anisöhl (*G.*), Olio dei Anice (*I.*).

This oil is of a whitish, or a pale straw colour, has the odour of the plant, and a slightly pungent, bitter, sweetish taste. It crystallises at 50° in flat tables. One hundred pounds of anise-seeds yield about ℔ ijss. of oil; but the produce varies. It is sometimes adulterated with wax, spermaceti, or camphor: but the fraud is easily detected; for on moderately warming the genuine oil the crystals dissolve, which is not the case with sophisticated.[1] The greater part

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[1] Baumé.

of the oil of anise-seed consumed in this country is prepared in Spain. The specific gravity of that made in England is ·9768; of that imported, or the foreign, ·9903.

Medical properties and uses. — This oil is used chiefly as a carminative; and, as it is less pungent than many of the other volatile oils, it is better adapted for relieving flatulence in children. It is given in doses of from ♏ v. to ♏ xv., triturated with sugar.

OLEUM ANTHEMIDIS, Lond. OLEUM VOLATILE ANTHEMIDIS NOBILIS, Edin. *Oil of Chamomile.*

Syn. Huile de Camomille Romaine (*F.*), Kamillenöhl (*G.*), Olio di Camamilla Romana (*I.*), Azeyte de Manganella de Botera (*S.*).

The odour of this oil is unpleasant, and the taste pungent. When recently distilled the colour is cerulean blue; but by exposure to light it changes to yellow. One hundred pounds of chamomile flowers yield ℔ ij. ℥ xij. of oil. The spec. grav. of the English oil, from the flowers only, is ·9083, of the foreign it is ·9289.

Medical properties and uses. — This oil is supposed to possess antispasmodic powers, and is therefore sometimes recommended in cramp of the stomach, and as an adjunct to purgative pills. The dose is from ♏ v. to ♏ xj.; but it is seldom used.

OLEUM CARUI, Lond. Dub. *Oil of Carraway.*

Syn. Huile de Carvi (*F.*), Kümmelöhl (*G.*), Olio di Carvi (*I.*), Azeyte de Alcorovea (*S.*).

Six pounds of carraway-seeds yield four ounces and a half of oil[1], which has an aromatic odour, and a sweetish, pungent taste; is viscid, and of a yellow colour. Its specific gravity is ·946.[2] W. Brande says ·9310.[3]

Medical properties and uses. — Oil of carraway is stimulant and carminative. It is chiefly used as an adjunct to purgative pills and to cover the disagreeable flavour of other substances. The dose is from ♏ j. to ♏. x.

OLEUM SEMINUM FŒNICULI DULCIS, Dub. *Oil of Fennel Seeds.*

Syn. Huile essentiale de Fenoule (*F.*), Fenchelöhl (*G.*), Olio di Finoichio (*I.*), Azey de l' Eneldo hinojo (*S.*).

Seventy-five pounds of fennel-seeds yield thirty ounces of oil[4], which is colourless, and congeals at 50°. It has the odour of the plant; and a hot, sweetish taste. Its specific gravity is ·997.[5]

Medical properties and uses. — The same as those of the plant: the usual dose is from ♏ ij. to ♏ xx. It is rarely used.

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[1] Baumé. [2] Ibid. [3] *Manual*, p. 342.
[4] Dehne. [5] Lewi

OLEUM JUNIPERI, Lond. OLEUM VOLATILE JUNIPERI COMMUNIS, Edin. OLEUM BACCARUM JUNIPERI, Dub. *Oil of Juniper.*

Syn. Huile essentiale de Genevrier (*F.*), Wachholder beeröhl (*G.*), Olio di Ginepro (*I.*).

Forty-eight pounds of the bruised German fruit of juniper yield six ounces of oil[1], of a specific gravity ·611[2], according to Lewis; but Mr. Brande states that of the English to be ·8688, the foreign ·8834.[3] As the oil is contained in the vittæ of the nut, it is necessary to bruise the fruit. Its odour is similar to that of turpentine, and the taste hot and acrid. It has a greenish-yellow colour, is viscid, and deposits a feculent matter when long kept. When genuine it is soluble in alcohol.

Medical properties and uses.—This oil is carminative, diaphoretic, and diuretic. It is sometimes given in dropsy, and may be added to fox-glove when it is exhibited in the form of pills. The dose is from ♏ ij. to ♏ x., combined with water by means of sugar or of mucilage.

OLEUM LAVANDULÆ, Lond. OLEUM VOLATILE LAVANDULÆ SPICÆ, Edin. OLEUM FLORUM LAVANDULÆ, Dub. *Oil of Lavender.*

Syn. Huile essentiale de Lavande (*F.*), Lavendelöhl (*G.*), Olio di Lavanda (*I.*) Azeyte de l' Espliego (*S.*).

One pound nine ounces of this oil are obtained from eighty pounds of lavender flowers. The odour is very fragrant, and the taste warm and agreeable. Its colour is a very pale, lemon-yellow: its specific gravity, according to Lewis, is ·936[4]; but Mr. Brande says, that the specific gravity of oil obtained from the flowers only is ·8960; that from the whole herb ·9206.

Medical properties and uses.—This oil is stimulant and cordial. It is chiefly used in hysteria and nervous headach, in doses of from ♏ j. to ♏ v., given on a lump of sugar.

OLEUM VOLATILE LAURI SASSAFRAS, Edin. OLEUM CORTICIS ET LIGNI SASSAFRAS, Dub. *Oil of Sassafras.*

Sixty pounds of bruised sassafras yield twelve ounces[5] of a viscid yellow oil, heavier than water, its specific gravity being 1·094.[6] Its odour is fragrant, and its taste hot and acrid, excoriating the lips when incautiously tasted. The Edinburgh College orders it to be distilled from the bruised root.

Medical properties and uses.—This oil is stimulant, and supposed to be also sudorific and diuretic. It is given in

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1 Dehne 2 Lewis. 3 Lewis.
4 Ibid. 5 Baumé. 6 Baumé.

chronic rheumatism, scurvy, and some cutaneous affections. The dose is from ♏ ij. to ♏ x., but it is scarcely ever ordered.

OLEUM MENTHÆ PIPERITÆ, Lond. OLEUM VOLATILE MENTHÆ PIPERITÆ, Edin. OLEUM HERBÆ FLORESCENTIS MENTHÆ PIPERITIDIS, Dub. *Oil of Peppermint.*

Syn. Huile essentiale de Menthe poivrée (*F.*), Pfeffermünzöhl (*G.*), Olio di Menta piperitide (*I.*).

Four pounds of the recent plant yield from one drachm and a half to three drachms and a half of this oil.[1] Its odour is strong, and its taste very pungent, at the same time it impresses a sensation of coldness. Its colour is brownish-yellow, becoming white when exposed to the light. Its spec. grav. is ·9070.

Medical properties and uses.—Oil of peppermint is stimulant and carminative, useful in cramp of the stomach, flatulent colic, and anorexia, rubbed up with sugar or mucilage.[2] The dose is from ♏ j. to ♏ iij.

OLEUM MENTHÆ VIRIDIS, Lond. OLEUM HERBÆ FLORESCENTIS MENTHÆ VIRIDIS, Dub. *Oil of Spearmint.*

Syn. Huile essentiale de Baume verte (*F.*).

This oil has a flavour similar to, but less grateful than that of peppermint: its taste is warm, and less pungent than that of peppermint. According to Lewis, its specific gravity is ·975.[3] Mr. Brande states it to be ·9394. Its colour is greenish.

Medical properties and uses.—The same as those of oil of peppermint. The dose is from ♏ ij. to ♏. v.

Officinal preparation. *Infusum Menthæ compositum.*

OLEUM MENTHÆ PULEGII, Lond. Dub. *Oil of Pennyroyal.*

Syn. Huile essentiale de Menthe Peuliot (F.), Poleiohl (*G.*), Olio di Puleggio (*I.*), Azeyte de Peleo (*S.*).

This oil is of a reddish yellow colour, and resembles in its other qualities the oil of peppermint. Its spec. grav. according to Lewis is ·978; according to Mr. Brande ·9390.

Medical properties and uses.—It is stimulant and antispasmodic, but is scarcely ever used. The dose may be from ♏ j. to ♏ v., given on a lump of sugar.

OLEUM ORIGANI, Lond. Dub. OLEUM VOLATILE ORIGANI MARJORANÆ, Edin. *Oil of common Marjoram.*

Syn. Huile essentiale d' Origan (*F.*), Dostöhl (*G.*), Olio di Crigano (*I.*), Azeyte de Origane Sylvestre (*S.*).

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1 Baumé.

2 Peppermint drops or lozenges are a mixture of starch, sugar, mucilage of tragacanth, and oil of peppermint.

3 Lewis.

One hundred and fifty pounds of dried leaves of common marjoram yield fifteen ounces of oil[1], of a yellow colour, having the odour of the plant, and a hot acrid taste. Its specific gravity is ·940.[2]

Medical properties and uses. — On account of its acrimony, this oil is never exhibited internally. It is used to allay toothach; two or three drops, on a piece of cotton, being put into the carious tooth.

OLEUM PIMENTÆ, Lond. OLEUM VOLATILE MYRTI PIMENTÆ, Edin. OLEUM BACCARUM PIMENTÆ, Dub. *Oil of Pimento.*

Syn. Huile essentiale de Poivre de Jamaïque (*F.*), Nelherpfefferöhl (*G.*), Olio di Pimento (*I.*)

This oil has the odour of the Pimento, with its pungent taste in an increased degree. It is of a reddish brown colour, is heavier than water, and its specific gravity 1·021.

Medical properties and uses. — It has the same properties as allspice in a greater degree; and is given in dyspeptic affections, colic, and tympanitis, in doses of from ♏ iij. to ♏ v. rubbed with sugar, or in any proper vehicle.

OLEUM ROSMARINI, Lond. Dub. OLEUM VOLATILE ROSMARINI OFFICINALIS, Edin. *Oil of Rosemary.*

Syn. Huile essentiale de Romarin (*F.*), Rosmarinöhl (*G.*), Olio di Rosmarino (*I.*).

Twenty-four pounds of the plant yield one ounce of a fluid colourless oil[3], the odour of which is less agreeable than that of the plant. It deposits crystals of camphor when long kept. Its specific gravity is ·9108.

Medical properties and uses. — It is stimulant; and frequently enters into the composition of liniments. The dose, as an internal remedy, may be from ♏ iij. to ♏ vj., but it is scarcely ever ordered.

OLEUM RUTÆ, Dub. *Oil of Rue.*

Twenty-one pounds of rue yield fifty-nine grains of oil[4], which has the strong, ungrateful odour and taste of the plant. When recently drawn, the colour of this oil is yellow; it deepens to a brown by age, and deposits a brownish, resinous, sediment. It congeals at 40° of Fahrenheit.

Medical properties and uses. — Oil of rue is stimulant and antispasmodic. It is sometimes given in hysteria, and in the convulsive affections of infants attendant on dentition; and is used as a rubefacient in palsy. The dose is from ♏ ij. to ♏ vj.

OLEUM HERBÆ JUNIPERI SABINÆ, Edin. OLEUM FOLIORUM SABINÆ, Dub. *Oil of Savine.*

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[1] Baumé. [2] Ibid. [3] Ibid. [4] Ibid.

Syn. Huile essentiale de Sabine (*F.*), Sevenbaumöhl (*G.*), Olio di Sabina (*I.*), Azeyte de Enebrio Sabina (*S.*).

Two pounds of savine are said to yield five ounces of oil.[1] It is limpid, has the odour of the plant, and is extremely acrid to the taste. Its colour is yellow; but it becomes nearly colourless on being kept exposed to light.

Medical properties and uses.—This oil is the principle on which the virtues of savine depend; thence it possesses the same properties, and is applicable to the same purposes as the plant. The dose is from ♏ ij. to ♏ vij., triturated with sugar.

OLEUM SAMBUCI, Lond. *Oil of elder flowers.* This is an oil which might have been left out of the Pharmacopœia.

OLEUM SUCCINI, Lond. *Oil of Amber.*

"Put the amber into an alembic, so that an acid liquor, the oil, and a salt impregnated with the oil, may distil them in a sand bath, with a fire gradually raised: then redistil the oil a second and a third time."

OLEUM SUCCINI, Edin. *Oil of Amber.*

"Take of amber in powder and of pure sand, *equal parts.* Mix them together in a glass retort, the capacity of which the mixture only half fills; and having adapted to it a large receiver, distil in a sand bath, with a gradually augmented heat. An aqueous fluid, tinged with a little yellow oil, will first come over; then a yellow oil, with an acid salt, and, lastly, a black and reddish oil. Pour the fluid from the receiver, and separate the oil from the water."

OLEUM SUCCINI PURISSIMUM, Edin. *Pure Oil of Amber.*

"Distil the oil of amber, mixed with six times its quantity of water, from a glass retort, until two thirds of the water pass over into the receiver. Then separate this purified volatile oil from the water, and keep it in well-stopped phials."

OLEUM SUCCINI RECTIFICATUM, Dub. *Rectified Oil of Amber.*

"Take of the oil which comes over in the preparation of succinic acid, *a pound;* water, *six pints.* Distil until two thirds of the water have passed into the receiver; then separate the oil."

Syn. Huile de Succin (*F.*), Bernsteinöhl (*G.*), Olio di Succino Rectificato (*I.*).

The oil of amber, as immediately procured by the distillation of amber, is of a dark colour, a thick consistence, and has a very fetid odour; but by successive distillations it is rendered thinner, of a lighter colour, and at length is obtained nearly limpid, and as fluid as alcohol. It is the result of the process, not pre-existing in the amber. Its spec. grav., at 75°, is ·758.

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[1] Murray.

Qualities. — Rectified oil of amber has a strong ungrateful odour, and a hot, acrid taste. It is light, volatile, and inflammable. It is slowly acted on by heat and air, becoming black and hard. It boils at 186°: imparts its taste and smell to water; but nothing more: is soluble in strong alcohol, and combines with oils.

Medical properties and uses. — Oil of amber is stimulant, antispasmodic, and rubefacient. It has been found serviceable in deficient menstruation, and in hysteria, epilepsy, and some other convulsive affections; but it is now scarcely ever administered as an internal remedy. The dose may be from ♏ v. to ♏ xij., combined with any distilled water by means of mucilage. It is more generally employed as a rubefacient in rheumatism and paralysis; and a mixture of f ℥ j. of this oil with f ℥ ss. of tincture of opium has been found beneficial as a friction in tic doloureux; and in hooping-cough, rubbed on the chest twice or three times a day.[1]

Officinal preparation. — *Spiritus Ammoniæ succinatus.*

OLEUM TEREBINTHINÆ, Dub. *Oil of Turpentine.*

"Take of common turpentine, *five pounds;* water, *four pints.* Distil the oil from a copper alembic. Yellow resin will remain in the retort after the distillation."

OLEUM TEREBINTHINÆ PURIFICATUM, Lond. Dub. *Rectified Oil of Turpentine.*

"Take of oil of turpentine, *a pint;* (*two pints,* Dub.); water, *four pints.* Distil cautiously the oil (*a pint and a half of the oil,* Dub.)."

OLEUM VOLATILE PINI PURISSIMUM, Edin. *Purified Oil of Turpentine.*

"Take of oil of turpentine, *one part;* water, *four parts.* Distil as long as any oil passes over."

Syn. Huile essentiale de Térébenthine (*F.*), Terpenthinöhl (*G.*), Olio di Trementina (*I.*), Azeyte de Pino (*S.*).

The chymical qualities and medicinal properties of oil of turpentine have been already noticed. (See PINUS, Part ii.) The rectification of it is a troublesome process, and on account of the great inflammability of the vapours, much caution is required to prevent them from escaping through the lutings of the vessel, and catching fire.

Qualities. — The rectified oil is a little lighter than the common oil, and completely free from any resinous admixture; it is colourless, limpid, and has a high refracting power. Its spec. grav. at 50°, is ·872; it boils at 313°. What remains in

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[1] The empirical nostrum, known by the name of *Roche's Embrocation,* for hooping-cough, consists of two parts of olive oil, one part of oil of amber, and one part oil of cloves.

the retort is thick resinous matter, and is denominated balsam of turpentine.

Medical properties and uses. — These have been already mentioned (Part II.). I have had ample opportunity of ascertaining the efficacy of oil of turpentine as a remedy for tape-worm. In every case in which I have administered it, the worm has been expelled, and the symptoms relieved. In general the animal has been voided dead, and of a livid hue; but in one instance, in which a portion of five feet in length was passed after two fluid ounces of the oil had been taken, it was not livid; and when voided, exhibited evident signs of animation. In no instance have I perceived that the large doses of the oil, which were taken for the above purpose, produced any particular effect on the urinary organs. The more usual sensible effects are temporary intoxication, accompanied with considerable nausea, and sometimes vomiting, which, after two or three alvine evacuations, subside, and leave a degree of languor for ten or twelve hours. The pain of the stomach and side, which is an usual concomitant of the disease, is always removed by the oil. I have also given this oil in combination with cinchona, with evident benefit in rheumatism; particularly in that modification of the disease, which attacks one side only of the head, and is periodical; the paroxysms generally coming once or twice in the twenty-four hours. Tincture of capsicum, in doses of ♏ iij. is a useful adjunct to the bark and turpentine in this affection. In some persons, however, turpentine affects the kidney, producing pain and bloody urine, and in others, its administration has produced a severe erythematic eruption over the body. These effects, however, are in some degree lessened by purifying the oil of turpentine by means of alcohol, as Dr. Nimmo suggests. To eight parts of the oil add "one part of alcohol, and agitate: on the mixture being left at rest, the oil falls to the bottom, and the spirit holding the impurities in solution floats at the top. On repeating this process three or four times, pouring off the spirit each time, the oil is left nearly tasteless, and inodorous."[1] The dose in rheumatism is f ʒ j., repeated every four hours; but in tænia it may be given in doses of f ℥ j. combined with syrup of poppies, repeated every six hours until the worm is expelled.

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[1] *Journ. of Science,* vol. xiii. pp. 65, 66.

OLEA EXPRESSA.

EXPRESSED OILS.

VEGETABLES yield two distinct species of oil, one of which is volatile at a high temperature, but the other cannot be volatilised without suffering decomposition. The first of these is termed *volatile oils*, the second, *fixed oils*. The latter name is properly adopted by the Edinburgh College, and is more suitable than *expressed oils*, the epithet given to this class of substances by the Dublin College.

FIXED OILS are obtained from fruits and seeds either by expression or decoction with water. The dicotyledons, or seeds with two seed-lobes, yield the greatest proportion of oil. When the first process is employed, the fruit or seed is put into a strong hempen or hair bag, and subjected to the press; during the action of which the oil is forced out, generally combined with some other of the vegetable principles, which are afterwards separated by subsidence. The process is facilitated, and the quantity of oil increased, by heating the plates of the press, or previously roasting the seeds; but the oil thus obtained is more liable to become rancid, and hence the cold-drawn oils are always preferred for medicinal purposes. When the oil is to be obtained by decoction, the fruits or seeds are to be bruised previously to being boiled; and the oil which is separated is to be skimmed off from the surface of the water on which it swims.

Fixed oils have different degrees of consistence; they are, 1. Fluid at the ordinary temperature of the atmosphere, congealing in a temperature a little higher than the freezing point of water. 2. Concrete at the ordinary temperature of the atmosphere, and require a higher degree for their liquefaction. The first are denominated *fluid oils;* the second, *vegetable butters.*

1. FLUID FIXED OILS are generally inodorous and nearly insipid, or have a mild taste. They are transparent, viscid, so as to run in streaks upon the sides of glass vessels, and have generally a slight tinge of colour, which may be removed by digestion with charcoal. They are generally lighter than water, but differ from each other in specific gravity. At about 600° of Fahrenheit they boil, and are then volatilised, but in a state of partial decomposition; the vapour readily catches fire, and burns with a yellow flame. When exposed to the atmosphere at a high natural temperature, such as exists in summer, or in heated rooms, the fixed oils expressed without heat become thick, lose much of their transparency, acquire a

sharp taste and a disagreeable odour, and are then said to be rancid; but when heat has been used in their expression, they only become thick, and acquire resinous properties. In both cases the changes are produced by the absorption of oxygen; but in the first case, owing to the combination of the oxygen with some of the vegetable mucilage present in the cold-drawn oil, sebacic acid is formed; and by its diffusion through the oil, the change in its properties is produced.

Fixed oils are insoluble in water; but they may be mingled through water, and kept suspended in it by means of mucilage or yolk of egg. They are, with one or two exceptions, nearly insoluble in alcohol and ether; but unite readily with each other, with volatile oils, and with resinous substances. They dissolve sulphur, and form what was formerly regarded a balsam with it. With the alkalies they combine, and form soaps; but with the acids undergo decomposition: and when boiled with some of the metallic oxides, tough, solid compounds, or plasters, are produced.

2. CONCRETE fixed oils possess nearly the same properties as the fluid fixed oils. They are, however, more soluble in alcohol and ether, but are not capable of entering so readily into combinations with the alkalies. The ultimate constituents of fixed oil are carbon, hydrogen, and oxygen.[1]

For medicinal purposes, these oils are required to be free from rancidity; consequently, they must be preserved in closed vessels, and carefully excluded from the air.

OLEUM AMYGDALI COMMUNIS, Edin. *Oil of the Almond.*

"Take fresh almonds, and bruise them in a stone mortar; then put them into a hempen sack, and express the oil by a press without heat."

OLEUM AMYGDALARUM, Dub. *Oil of Almonds.*

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1 When oil is distilled, as soon as it begins to boil a large quantity of gas is disengaged, consisting of a mixture of carbonated hydrogen and oxide of carbon. The *first* product of the distillation is a yellow-coloured, very odorous substance, of a moderate consistence, very soluble in alcohol, reddening strongly the tincture of litmus, and forming a true soap with dilute liquor of potassa. It may be regarded as a mixture of acetic, sebacic, oleic, and margaric acids, empyreumatic oil, a volatile oil slightly odorous, and a peculiar volatile matter, very fetid, not acid, soluble in water; and which excites coughing and tears in the operator when the receiver is opened. The *second* product is a light-green fluid, which becomes brown on exposure to the air; has a slight empyreumatic odour, but does not excite coughing or tears. It does not redden tincture of litmus; alcohol, even when aided by heat, dissolves a very small portion only of it, and it is not affected by potassa. It burns like an essential oil,; and is volatilised, without change, in close vessels. The *third* product is an orange-red, solid, transparent substance, inodorous and insipid: breaking with a waxy fracture, melting at a heat above 100° centig.; and dissolving in hot alcohols, from which it is precipitated, unaltered on cooling. Æther is its proper solvent. *Annales de Chimie et de Phys.* tom. xxx. pp. 1—20.

"Bruise fresh almonds in a mortar; and then express the oil by a press, without heat."

Syn. Huile d'Amandes (*F.*), Mandelnöhl (*G.*), Olio di Mandarleh (*I.*), Vädomcottay unnay (*Tam.*).

The oil obtained from both the sweet and the bitter almond is equally free from bitterness, if heat be not employed. Sixteen ounces of almonds yield about five ounces[1] of a bland, inodorous oil, of a very slightly sweetish taste, which is at first a little turbid, but soon becomes clear. Its colour is a very pale greenish yellow, and its specific gravity ·932.[2] The oil from the bitter almond, it is said, keeps longer without growing rancid than that from the sweet almond. It is soluble in ether, in the proportion of f ʒ x. to ℥ iv. of æther.

Medical properties and uses.—This oil is demulcent and emollient, and is used in coughs and other pulmonary complaints, united with water by means of mucilage or the yolk of egg and sugar. A mixture of f ℥ iv. of almond oil, and ♏ viij. of acetate of lead, forms an useful injection at the commencement of gonorrhœa. The dose of the oil for internal administration is from f ʒ iv. to f ℥ j.

OLEUM LINI, Dub. OLEUM LINI USITATISSIMI, Edin. *Oil of Linseed.*

"Bruise the seeds of common flax, and afterwards express the oil, without heat."

Syn. Huile de graine de lin (*F.*), Leinöhl (*G.*), Olio de Lino (*I.*), Azéyte, de Laxoe (*S.*).

The proportion of oil thus obtained is about 20 per cent. of the seed employed. It is combined with a considerable portion of mucilage[3], has a strong, disagreeable odour, and a nauseous taste; is not congealed, except by a cold, below 0° of Fahrenheit; and boils at 600° of the same scale. Its colour is a high yellow; and its specific gravity ·932.[4] Four ounces of alcohol are required to dissolve one drachm of it: but the same quantity of æther takes up a fluid ounce and a half. One hundred weight of seeds yields from 18 to 20 lbs of oil.[5]

Medical properties and uses.—Linseed oil is emollient, demulcent, and slightly laxative. On account of its nauseous taste, it is seldom used as an internal remedy, although it has been given with advantage in ileus when purgatives have failed. It is chiefly employed in the form of glyster in flatulent colic, attended with costiveness, and in abrasions of the

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[1] About ʒiij. more may be obtained by impregnating the marc with the steam of boiling water.

[2] Fabroni.

[3] The oil usually prepared on a great scale is more free from mucilage, the seeds being roasted before they are subjected to the press.

[4] Shaw's *Boyle*, ii. 346.

[5] *Brande's Manual*, p. 336.

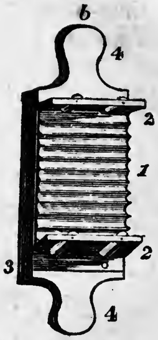
rectum; and is an useful application to burns, especially when combined with lime-water. The dose when taken by the mouth, is from f ℥ss. to f ℥ j.; but f ℥ vj. may be given at once per anum.

Officinal preparation.— *Linimentum Aquæ Calcis*, E.

PILULÆ.

PILLS.

PILLS are masses of a consistence sufficient to preserve a round form, yet not so hard as to be of too difficult solution in the stomach. This form of preparation is particularly adapted for medicines which have a very nauseous taste or flavour, and such as operate in minute doses. Extracts, when not too hard, may be formed into pills without any addition; but more generally pills are composed of either vegetable, or earthy, or metallic powders, combined by means of syrup into a coherent mass. Salts also may be formed into pills, except such as are deliquescent; and when efflorescent salts are used, they should be first freed from the water of crystallisation, for the pills formed with uneffloresced salts which are apt to effloresce fall into powder as they dry. The masses which are ordered to be kept prepared for the formation of pills require to be preserved in covered pots, wrapped in bladders, and occasionally moistened. When they are to be formed into pills, a given portion of the mass is rolled into a cylinder, the length of which is regulated by the number of pills into which it is to be divided; and the division is effected either as equally as possible by the hand, or by a machine invented for the purpose. This machine consists of two pieces. The first, *a*, is divided into three compartments; 1. a vacant space to receive the divided mass, which is to be rolled into pills; 2. a grooved brass plate, which assists in dividing the mass into pills; and, 3. a box for containing a powder for covering the pills after they are formed. The second, *b*, consists of a brass plate 1, grooved to match the plate 2 on piece *a*, and bounded at both ends by moveable projecting plates 2 2, containing two wheels under the ledge of the plate 2; and a wooden back 3, with two handles, 4 4, to which this plate is affixed. In using the machine the cylindrical mass is placed on 2 *a;* and divided by passing *b* over it, the wheels of *b*, enabling it to run easily, being applied to a brass plate which forms the margin of *a*.



After the round form is given to each of the pills, by rolling the divided pieces between the fingers, they are dropped into 3 *a*, and covered by some dried powder: as, for instance, subcarbonate of magnesia or starch, to prevent them from adhering. With the same intention pills were formerly, and, in a few instances, are still gilded and silvered; but simple dry powders answer all the purposes of these coverings.

PILULÆ ALOES COMPOSITÆ, Lond. *Compound Aloetic Pills.*

"Take of aloes, powdered, *an ounce;* extract of gentian, *half an ounce;* oil of carraway, *forty minims;* syrup, *a sufficient quantity.* Beat them together until they are incorporated."

PILULÆ ALOETICÆ, Edin. *Aloetic Pills.*

"Take of socotorine aloes, in powder, soap, of each *equal parts.* Beat them with simple syrup, so as to make a mass fit for forming pills."

PILULÆ ALOES COMPOSITÆ, Dub. *Pills of Aloes and Ginger.*

"Take of hepatic aloes, *an ounce;* ginger root, in powder, *a drachm;* soap, *half an ounce;* essential oil of peppermint, *half a drachm.* Let the aloes and the ginger be rubbed together to a powder: then add the soap and the oil, so as to form a mass."

Syn. Pilules d'Aloë composée (*F.*), Pillole d'Aloë composte (*I.*).

In the London preparation, the quantity of extract of gentian ordered is too large: owing to its reaction on the aloes, the mass becomes too soft to form into pills: at all events, no syrup is required. The soap in the two other formulæ is well adapted for giving consistence and form to the aloes. This is an useful pill: it is employed for obviating the habitual costiveness of the sedentary, and of leucophlegmatic habits. The dose is from grs. x. to grs. xv. or more.

PILULÆ ALOES ET ASSAFŒTIDÆ, Edin. *Pills of Aloes and Assafœtida.*

"Take of socotorine aloes in powder, assafœtida, soap, of each *equal parts.* Beat them into a mass with mucilage of gum-arabic."

Syn. Pilules d'Aloë avec Assafœtida (*F.*), Pillole Aloeteche con assafetida (*I.*)

These pills are anodyne and cathartic. They have been found extremely useful in dyspepsia attended with flatulence. The dose is grs. x., given twice a day.

PILULÆ ALOES CUM MYRRHA[1], Lond. *Pills of Aloes with Myrrh.*

"Take of aloes, *two ounces*, saffron, myrrh, of each *an ounce;* syrup, *a sufficient quantity.* Rub separately to powder the aloes and the myrrh; then beat all the ingredients together until they form an uniform mass."

Dublin.

"Take of hepatic aloes, *two ounces;* myrrh, saffron, of each *one ounce;* simple syrup, *a sufficient quantity.* Rub the myrrh and the aloes separately to powder, and beat the whole together into a mass."

PILULÆ ALOES ET MYRRHÆ, Edin. *Pills of Aloes and Myrrh.*

"Take of socotorine aloes, *four parts;* myrrh, *two parts;* saffron, *one part.* Beat them into a mass with simple syrup."

Syn. Pilules d'Aloë avec la Myrrhe (*F.*), Pillole Aloetiche con Mirra (*I.*).

These useful pills have been employed since the time of Rhazes, to stimulate and open the bowels in chlorotic, hypochondriacal, and cachetic habits. The dose is from grs. x. to ℈j., given twice a day.

PILULÆ AMMONIURETI CUPRI, Edin. *Pills of Ammoniuret of Copper.*

"Take of ammoniuret of copper, rubbed to fine powder, *sixteen grains;* crumb of bread, *four scruples;* water of carbonate of ammonia, *a sufficient quantity.* Beat them into a mass, and divide it into thirty-two equal pills."

Syn. Pilules cuivreuses de Swédiaur (*F.*).

This is a convenient form for the exhibition of the ammonio-sulphate of copper, half a grain of which is contained in each of the pills. They are given in epilepsy and other spasmodic diseases. One pill, given night and morning, is sufficient at first; but the number may be gradually increased till five be taken for a dose.

PILULÆ CAMBOGIÆ COMPOSITÆ, Lond. Edin. Dub. *Compound Pills of Gamboge.*

"Take of gamboge, in powder, *a drachm;* aloes, in powder,

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[1] Pilulæ ruffi seu communes, P. L. 1720.

a drachm and a half; ginger, in powder, *half a drachm ;* soap, *two drachms.* Mix the powders together; then add the soap, and beat the whole together into an uniform mass."

This is considerably more active than the aloetic pills. The dose is from grs. x. to ℈j., given at bed-time in obstinate costiveness.

PILULÆ COLOCYNTHIDIS COMPOSITÆ, Edin. Dub. *Compound Colocynth Pills.*

"Take of socotorine aloes, scammony, of each *eight parts ;* colocynth pulp, *four parts ;* sulphate of potassa, oil of cloves, of each *one part.* Beat the extract, gum resin, and sulphate together into powder, then, with the colocynth pulp rubbed to fine powder, mix them with the oil, and, finally, beat the whole into a mass with mucilage of gum."

This pill is more powerful in its operation than any other aloetic pills; and it does not so soon lose its power when taken for any considerable length of time in habitual costiveness. Dose from grs. x. to grs. xv.

PILULÆ CONII COMPOSITÆ, Lond. *Compound Pills of Hemlock.*

"Take of extract of hemlock, *five drachms ;* ipecacuanha, powdered, *a drachm ;* mixture of acacia, *a sufficient quantity.* Beat them together into a mass."

A useful form of administering conium in conjunction with ipecacuanha in bronchitis, pertussis, and other pulmonary affections. The dose is from grs. v. to grs. vii.

PILULÆ FERRI COMPOSITÆ, Lond. Dub. *Pills of Iron with Myrrh.*

"Take of myrrh, in powder, *two drachms ;* carbonate of soda, sulphate of iron, treacle, of each *a drachm.* Rub the myrrh with the carbonate of soda; then, having added the sulphate of iron, rub again; and, lastly, beat the whole in a mortar previously warmed into an uniform mass."

This is an useful emmenagogue pill, similar in its properties to Griffith's mixture. The dose is from grs. x. to ℈j., given twice or three times a day.

PILULÆ GALBANI COMPOSITÆ[1], Lond. *Compound Pills of Galbanum.*

"Take of galbanum, *an ounce ;* myrrh, sagapenum, of each *an ounce and a half ;* assafœtida, *half an ounce ;* syrup, *a sufficient quantity.* Beat them together into an uniform mass."

PILULÆ ASSAFŒTIDÆ COMPOSITÆ, Edin. *Compound Assafœtida Pills.*

"Take of assafœtida, galbanum, myrrh, of each *eight parts ;* purified oil of amber, *one part.* Beat them into a mass with simple syrup."

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[2] Pilulæ gummosæ, P. L. 1720.

Dublin.

"Take of assafœtida, *half an ounce;* myrrh in powder, *one ounce and a half;* sagapenum, galbanum, of each *an ounce;* oil of amber, *half a drachm.* Rub them together, and make them into a mass with simple syrup."

Syn. Pilules de Galbanum composée (*F.*), Pillole di Galbano composte (*I.*).

These preparations are useful antispasmodics and emmenagogues; and are given with advantage in chlorosis, hysteria, and hypochondriasis. The dose is from grs. x. to ℈j., taken every night at bed-time.

PILULÆ HYDRARGYRI, Lond. Dub. *Mercurial Pills.*

"Take of mercury, *two drachms;* confection of the French rose, *three drachms;* liquorice in powder, *a drachm.* Rub the mercury with the confection until the globules disappear; then add the liquorice root, and beat the whole into an uniform mass."

Edinburgh.

"Take of purified mercury, conserve of the red rose, of each *an ounce;* starch, *two ounces.* Rub the mercury with the conserve in a glass mortar until the globules entirely disappear, adding, if necessary, a little mucilage of gum-arabic; then add the starch, and with a little water beat the whole into a mass, which is to be directly divided into four hundred and eighty equal-sized pills."

Syn. Pilules mercurielles (*F.*), Pillole mercuriale (*I.*).

One grain of mercury is contained in three grains of the mass, made according to the London and Dublin formulæ, and in four grains according to the Edinburgh.

In these preparations the mercury is first minutely divided by the viscosity of the conserve, the substance with which it is triturated, and it is supposed that the metal is oxidized; and that the great extension of surface, and, in some degree, the substance used in the trituration, facilitate this effect. Further experiments are certainly requisite to determine this question. Syrup, honey, mucilage, soap, guaiacum, and other matters, have been occasionally employed; on the Continent the oil of eggs has been used for dividing the mercury[1], and certainly no substance so rapidly assists in producing the desired effect as this oil, when it has been kept for some time. The more assiduously the trituration is continued, the more perfect is the preparation. The sufficient division of the metal, or the oxidizement of the whole of the globules, or the extinction or killing of the mercury, in the common language

[1] Vide *Lond. Med. Repository,* vol. v. p. 166.

of the laboratory, is known to be completed, when, on rubbing a small portion of the mass with the point of the finger on a piece of clean paper, no metallic globules are perceptible. The mass must be then immediately formed into pills, as it very rapidly becomes too hard, if allowed to remain.

Medical properties and uses.—These pills are alterative and antisyphilitic, and are the most common form under which mercury is exhibited for the cure of venereal affections, being much less liable to act on the bowels than any of the other forms. When they act on the bowels, they should be combined with opium, or with a few grains of rhubarb, which enable the bowels to resist the mercurial irritation. The common dose is from grs. v. to grs. x., or two pills, given twice a day, until the mouth be affected. Larger doses excite purging.

PILULÆ HYDRARGYRI CHLORIDI COMPOSITÆ, Lond. PILULÆ SUBMURIATIS HYDRARGYRI, Edin. PILULÆ CALOMELANOS COMPOSITÆ, Dub. *Pills of Chloride of Mercury.*

"Take of chloride of mercury (*calomel*), oxysulphuret of antimony, of each *two drachms;* guaiacum resin, powdered, *half an ounce;* treacle, *two drachms.* Rub the chloride of mercury with the oxysulphuret of antimony, then with the guaiacum resin and treacle to a proper consistence."

This preparation was introduced into practice by Dr. Plummer, and admitted into the Edinburgh Pharmacopœia under the name of Plummer's pill. It was, however, afterwards expunged; but as it continued to be much used in practice, the London College has retained it in its Pharmacopœia. It is a very useful alterative in lepra, in secondary syphilis affecting the skin, and in other cutaneous diseases. The dose is from grs. v. to grs. x., given night and morning.

PILULÆ HYDRARGYRI IODIDI, Lond. *Pills of Iodide of Mercury.*

"Take of iodide of mercury, *a drachm;* confection of the French rose, *three drachms;* ginger powdered, *a drachm.* Beat them together into a mass."

A useless form, the iodide being easily formed into a pill; and being kept better in the state of powder. One grain of the iodide is contained in five grains of the mass. The dose is grs. v. to grs. x.

PILULÆ IPECACUANHÆ COMPOSITÆ, Lond. *Compound Pills of Ipecacuanha.*

"Take of compound powder of ipecacuanha, *three drachms;* fresh dried squ[illegible] ammoniacum, of each *a drachm;* mixture of acacia, *a suff[illegible]antity.* Beat them together into a mass. This form [illegible] a stimulant expectorant, useful in some forms of asthma. [illegible]e dose is grs. v. to grs. x.

PILULÆ RHEI COMPOSITÆ, Lond. Edin. *Compound Rhubarb Pills.*

"Take of rhubarb, in powder, *one ounce;* powdered aloes, *six drachms;* myrrh, *half an ounce;* soap, *a drachm;* oil of carraway, *half a fluid drachm;* syrup, *a sufficiency.* Mix the powders, and beat them into a mass."

Syn. Pilules de Rhubarbe composée (*F.*), Pillole di Rhabarbaro composte (*I.*).

This is a warm, stomachic, laxative pill, very useful for obviating costiveness, and at the same time giving tone to the bowels in dyspepsia and hypochondriasis. The dose is from grs. x. to ℈j., given twice a day.

PILULÆ SAPONIS COMPOSITÆ, Lond. Dub. *Compound Pills of Soap.*

"Take of hard opium, powdered, *half an ounce;* soap, *two ounces.* Beat them together into a mass." Five grains contain one grain of opium.

PILULÆ OPIATÆ: olim PILULÆ THEBAICÆ, Edin. *Opiate Pills;* formerly *Thebaic Pills.*

"Take of opium, *one part;* extract of liquorice, *seven parts;* pimenta berries, *two parts.* Mix the opium and the extract, separately softened with diluted alcohol, and beat them into a pulp; then add the Jamaica pepper rubbed to powder, and beat the whole to a mass." Ten grains contain one grain of opium.

PILULÆ STYRACIS COMPOSITÆ, Lond. *Compound Pills of Storax.*

"Take of purified storax, *three drachms;* hard opium, powdered, saffron, *of each a drachm.* Beat them together into a mass."

PILULÆ E STYRACE, Dub. *Storax Pills.*

"Take of purified storax, *three drachms;* soft purified opium, saffron, of each *a drachm.* Mix them well together, by beating." Five grains contain one grain of opium.

Syn. Pilules d'Opium (*F.*), Storax pillen (*G.*), Pillole d'Oppio (*I.*).

The substances with which the opium is combined in these pills do not interfere with its operation as an anodyne, but are intended chiefly to cover its odour and taste, in cases where the patient or his friends have an objection to opium; and as it is also sometimes necessary that it should not appear even in the prescription. The dose of these preparations differs, and must be regulated by the quantity of opium contained in that one which is adopted.

PILULÆ SAGAPENI COMPOSITÆ, Lond. *Compound Pills of Sagapenum.*

"Take of sagapenum, *an ounce;* [illegible] *a drachm;*

syrup of ginger, *a sufficient quantity*. Beat them together into a mass."

A stimulant antispasmodic, which may prove serviceable in colic. The dose is grs. v. to grs. x.

PILULÆ SCILLÆ COMPOSITÆ, Lond. Dub. *Compound Squill Pills.*

"Take of fresh squill, dried and powdered, *one drachm;* ginger, powdered, ammoniacum, powdered, *each two drachms;* soap, *three drachms;* syrup, *a sufficiency.* Mix the powders together; then beat them with the soap, as much syrup being added as will give them a proper consistence."

PILULÆ SCILLITICÆ, Edin. *Squill Pills.*

"Take of squill root (bulb), dried, and rubbed to a fine powder, *one scruple;* ammoniacum, cardamom seeds powdered, extract of liquorice, *one drachm.* Beat them with syrup into a mass."

Syn. Pilules de Scille (*F.*), Pillole Squilitiche (*I.*).

These pills are useful expectorants in chronic bronchitis dyspnœa, and asthma; and combined with calomel and digitalis in hydropic affections. They are liable, however, to the same objections as the squill powder, the efficacy of the squill being much injured by keeping in either form; and it is perhaps better that it should be always given under an extemporaneous form, except when the tincture is used. The dose is from grs. iv. to xij., given three or four times a day.

PILULÆ SUBCARBONATIS SODÆ, Edin. *Pills of Subcarbonate of Soda.*

"Take of exsiccated subcarbonate of soda, *four parts;* hard soap, *three parts.* Beat into a mass with simple syrup."

This preparation was recommended by the late Dr. Beddoes; and has been found occasionally useful.

PILULÆ SULPHATIS FERRI COMPOSITÆ, Edin. *Compound Pills of Sulphate of Iron.*

"Take of sulphate of iron, reduced to powder, *one ounce;* extract of chamomile flowers, *one ounce and a half;* oil of peppermint, *a drachm.* Beat into a mass with simple syrup."

This is an useful tonic pill, and may be given with advantage in dyspepsia and other affections in which steel is indicated. A five-grain pill will contain two grains and a half of the sulphate of iron.

PULVERES.

POWDERS.

THIS form of preparing medicines is the simplest, and perhaps the least objectionable; but it is not applicable to all the articles of the materia medica. Those remedies, which are very unpleasant to the taste; those which deliquesce rapidly when exposed to the air, or are very volatile; and those which require to be given in large doses, or which are not diffused readily in water, cannot with propriety be administered in the form of powder. Some substances cannot be reduced to powder, unless they be very much dried; and the heat necessary for that purpose alters their properties; even the impalpable form given to powders is injurious to some resinous substances; and we cannot be surprised that a great alteration should be effected in a short time by the action of the air on so great an extension of surface as takes place in the operation usually adopted for reducing drugs to fine powder. *Cinchona*, *rhubarb*, *ipecacuanha*, and *guaiacum*, operate much less powerfully in the state of impalpable powder, than when reduced to that degree of fineness only, which can be effected by simply beating them in mortar, and passing them through a coarser sieve than is employed in the former case.

As powders are generally affected by the action of the air and light, all powders should be kept in opaque or green glass bottles. The effect of light on the majority of powders is rendered obvious by the labelled sides of clear bottles containing them, which are always turned to the light, becoming encrusted with the powder changed in its colour, while the other side remains clear and transparent.

In forming compound powders, it is necessary to sift the mixture after it has been well triturated. The following general rule for the formation of powders is given by the Dublin College:—"Let the substances to be powdered be first dried[1], and then beaten in an iron mortar; then separate the finer powder by shaking it through a hair sieve, and preserve it in close vessels."

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[1] Mr. Battley, a respectable druggist in London, has proposed the following method of drying narcotic plants for powders:—

Previous to the process of drying the leaves of plants, the same rules must be carefully observed in reviving them, which were recommended previously to their being pressed for extracts.

The leaves being in a high state of preservation, and entirely freed from the stalks, and as much as possible from external moisture, must be laid in thin layers in baskets of willow stripped of its bark, in a drying room, from which the light is

ABSTRACT of the Table of MM. Henry and Guibourt, showing the loss in powdering certain substances.
1000 Parts of

Roots.		*Barks.*	
Acorus Calamus	yield 840	Cinchona, pale	yield 875
Calumba	900	——— yellow	900
Jalap	940	——— red	880
Ipecacuanha	750	Cinnamon	890
Rhatany	850	Cusparia	825
Rhubarb	920	Simaruba	900
Serpentaria	800		
Leaves.		*Vegetable Products.*	
Belladonna	785	Aloes	960
Conium	800	Tragacanth	940
Digitalis	790	Opium	930
Henbane	530	Gum Arabic	925
Senna	790	Scammony	915
Flowers.		Catechu	900
Chamomile	850	*Animal Substances.*	
Saffron	809	Castor	900
Fruits.		Cantharides	959
Mustard	950	*Mineral Substances.*	
Sabadilla	900	Red Oxide of Mercury	980
Black pepper	900	Arsenious acid	950
Nux vomica	850	Sulphuret of Antimony	950
Colocynth	500	Red Sulph. of Mercury	950

PULVIS ALOES COMPOSITUS, Lond. *Compound Powder of Aloes.*[1]

" Take of extract of aloes, *an ounce and a half;* guaiacum resin, *an ounce;* compound powder of cinnamon, *half an ounce.* Powder the aloes and the guaiacum resin separately; then mix them with the compound powder of cinnamon."

PULVIS ALOES COMPOSITUS, Dub. *Powder of Aloes with Guaiac.*

" Take of hepatic aloes, *an ounce and a half;* guaiacum gum-resin, *an ounce;* aromatic powder, *half an ounce.* Rub the aloes and the guaiacum separately to powder; then mix them with the aromatic powder."

Both the active substances in these powders are ill adapted

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quite excluded. They should be then exposed to a temperature of not less than from 130 to 140 deg. of Fahrenheit's thermometer for three or four hours, or until the leaves begin to shrivel. They are then to be turned in the same temperature, and the heat kept up for six or eight hours longer, when the operation is generally finished; which is known by the leaves crumbling without much difficulty in the hand. If the process has been in all its parts properly managed, the result will be, that the leaves retain a beautiful green colour, and also in a high degree the medical properties of the plant to which they belong.

To preserve them in this desirable state, oil jars, made perfectly clean and dry are found to answer best. Place the leaves lightly in the jars, and hermetically seal them. The filled jars ought to be kept in a dry and warm situation.

[1] Pilulæ de diambræ, P. L. 1720. Pulvis aloes cum guaiaco, P. L. 1787.

for this form of preparation; and the addition of the aromatic is scarcely sufficient to cover the nauseous taste of the aloes. They are warm sudorific cathartics, and may be given in doses of from grs. x. to ℈j., but they are seldom ordered.

PULVIS ALOES CUM CANELLA, Dub. *Powder of Aloes with Canella.*

"Take of hepatic aloes, *a pound;* white canella, *three ounces.* Rub them separately to powder, and then mix them."

This powder is liable to the same objection as the former, although the canella covers the taste better than the aromatic powder. It has been long known in the shops under the name of *Hiera Picra;* and is used as a domestic remedy, infused in wine or spirits. From grs. x. to ℈j., may be given for a dose.

PULVIS ASARI COMPOSITUS, Edin. *Compound Powder of Asarabacca.*

"Take of the leaves of asarabacca, *three parts;* the leaves of marjorum, flowers of lavender, of each *one part.* Rub them together to a powder."

Dublin.

"Take of dried leaves of asarabacca, *an ounce;* lavender flowers, dried, *one drachm.* Rub them together to a powder."

A few grains of this powder snuffed up the nostrils for several successive evenings at bed-time excite sneezing and a copious discharge of mucus, which continues to flow on the succeeding day. It has been particularly used in toothach and chronic ophthalmia.

PULVIS CINNAMOMI COMPOSITUS, Lond. *Compound Powder of Cinnamon.*[1]

"Take of cinnamon, *two ounces;* cardamoms, *an ounce and a half;* ginger, *an ounce;* long pepper, *half an ounce.* Rub them together to a very fine powder."

PULVIS AROMATICUS, Edin. *Aromatic Powder.*

"Take of cinnamon bark, cardamom seeds, ginger root, of each *equal parts.* Rub them to a very fine powder, which is to be preserved in a well-stopped phial."

PULVIS AROMATICUS, Dub. *Aromatic Powder.*

"Take of cinnamon bark, *two ounces;* lesser cardamom seeds, freed from the husks, ginger, long pepper, of each *one drachm.* Rub them together to a powder."

Syn. Poudre aromatique (*F.*), Gewurpulver (*G.*). Polvere aromatica (*I.*).

These combinations of aromatics are stimulant and car-

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[1] Species diambræ sine odoratis, P. L. 1720. Species aromaticæ, P. L. 1745. Pulvis aromaticus, P. L. 1787.

minative, and may be used to expel flatus in cold phlegmatic habits; but they are more generally employed to give warmth to other compositions. The dose is from grs. v. to ℈j.

Officinal preparations.—*Pulvis Aloes compositus*, L. D. *Electuarium aromaticum*, E. *Electuarium opiatum*, E.

PULVIS CORNU CERVINI USTI, Dub. *Powder of burnt Hartshorn.*

" Let pieces of hartshorn be burnt until they become white; then reduce them to a very fine powder."

PULVIS CRETÆ COMPOSITUS, Lond. Dub. *Compound Powder of Chalk.*

" Take of prepared chalk, *half a pound;* cinnamon, *four ounces;* tormentil, acacia, of each *three ounces;* long pepper, *half an ounce.* Rub them separately to fine powder; then mix."

PULVIS CARBONATIS CALCIS COMPOSITUS, Edin. *Compound Powder of Carbonate of Lime.*

" Take of prepared carbonate of lime, *four ounces;* cinnamon bark, *a drachm and a half;* nutmegs, *half a drachm.* Rub them together to a powder."

The London preparation, owing to the larger proportion of aromatics it contains, and the addition of the tormentil root, is better adapted for checking atonic diarrhœa than the Edinburgh powder, which may be regarded as a simple but grateful antacid. The dose is from grs. v. to ℈jss. given generally in the form of mixture, rubbed up with mucilage and some distilled water.

PULVIS CRETÆ COMPOSITUS CUM OPIO, Lond. Dub. *Compound Powder of Chalk with Opium.*

" Take of compound powder of chalk, *six ounces and a half;* hard opium, powdered, *four scruples.* Mix them."

PULVIS OPIATUS[1], Edin. *Opiate Powder.*

" Take of opium, *one part;* prepared carbonate of lime, *nine parts.* Rub them together to a fine powder."

Syn. Poudre opiate (*F.*), Opiumspulver (*G.*), Polvere oppiata (*I.*).

The addition of opium to the compound powder of chalk renders it more useful in diarrhœa; and from the minute division of the opium, it forms a useful opiate powder for children suffering under the irritative diarrhœa of teething. ℈ij. contain gr. j. of opium. The dose is from ℈j. to ʒj. for adults.

PULVIS JALAPÆ COMPOSITUS, Lond. *Compound Powder of Jalap.*

" Take of jalap, *three ounces;* bitartrate of potassa, *six*

1. Pulvis opiatus, P. L. 1787.

ounces; ginger, *three drachms.* Triturate separately each into powder, and then mix."

Edin. Dub.

"Take of powder of jalap root, *one part;* supertartrate of potassa, *two parts.* Rub them together to a fine powder."

The addition of the bitartrate, besides dividing the jalap very minutely, modifies also its purgative operation. The ginger of the London formula is a useful addition. This powder is a useful purgative in habitual costiveness: it is also very serviceable to children with tumid bellies, in worm cases, and in dropsy. The dose is from ℈j. to ℈ij. for adults.

PULVIS IPECACUANHÆ COMPOSITUS, Lond. Dub. *Compound Powder of Ipecacuanha.*

"Take of ipecacuanha, powdered, hard opium, powdered, each *a drachm;* sulphate of potassa, powdered, *an ounce.* Mix them."

PULVIS IPECACUANHÆ ET OPII, Edin. *Powder of Ipecacuanha and Opium.*

"Take of ipecacuanha root, powdered, opium, of each *one part;* sulphate of potassa, *eight parts.* Rub them together to a fine powder."

Syn. Poudre d'Ipecacuanha et d'opium (*F.*), Davers schmerzstillendes pulner (*G.*), Polvere d'Ipecacuanha ed oppio (*I.*).

In this powder the sulphate of potassa is intended to divide the opium mechanically; for on the finely powdered state of the ingredients depends much of the action of the opium and ipecacuanha. In the original *Dover's powder,* the saline ingredient was procured by deflagrating a mixture of equal parts of nitrate of potassa and sulphate of potassa; and the nitre is still retained as an ingredient in the *compound powder of ipecacuanha and opium* of the French codex. The Pharmacopœia Danica and the Pharmacopœia Austriaca order sugar instead of any salt; but it is less calculated to assist in the pulverization of the opium, and is apt also to attract moisture, and form the powder into a solid mass. The following table shows the proportion of opium in this powder, as ordered in the principal pharmacopœias of Europe.

Lond.	Edin.	Gallica.	Swed.	Dan.	Boruss.	Austr.
$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{11}$	$\frac{1}{60}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$

Compound ipecacuanha powder operates as a powerful sudorific; and is very efficaciously given in all cases, whether inflammatory or not, in which sweating is indicated; the relaxant power of the ipecacuanha acting upon the exhalents of the skin, to which the stimulant power of the opium carries the blood, by augmenting the force of the circulation. The dose is from grs. v. to ℈j., given diffused in mucilaginous fluid, or in the form of bolus. The action is assisted by plentiful dilution with tepid fluids; but these must not be drunk immediately after taking the powder, as it would aid its aptitude to be rejected by vomiting. Ten grains of this powder contain one grain of opium.

PULVIS KINO COMPOSITUS, Lond. Dub. *Compound Powder of Kino.*

"Take of kino, *fifteen drachms;* cinnamon, *half an ounce;* hard opium, *a drachm.* Rub them separately to a fine powder, then mix."

This is a bad form of an astringent anodyne powder. The dose is from grs. x. to ℈j. Twenty grains of the powder contain one grain of opium.

PULVIS QUERCUS MARINÆ, Dub. *Powder of Yellow Bladder Wrack.*

"Take of bladder-wrack in flower, *any quantity.* Let it be dried and freed from the sordes, then exposed to heat in an iron vessel or crucible, to which a perforated lid is adapted, until, the vapours ceasing, it becomes obscurely red hot. Reduce the carbonaceous matter which remains to powder."

This powder is a mixture of soda, iodine, and charcoal. (For its medicinal effects, see *Fucus*, Part ii.)

PULVIS SALINUS COMPOSITUS, Edin. Dub. *Compound Saline Powder.*

"Take of pure muriate of soda, sulphate of magnesia, of each *four parts;* sulphate of potassa, *three parts.* Dry the salts with a gentle heat, then pulverize them separately, and afterwards rub them together. Preserve the powder in a well-stopped phial.

This powder is a simple purgative, and does not appear to possess any peculiar advantages.

PULVIS SCAMMONII COMPOSITUS, Lond. Dub. *Compound Powder of Scammony.*

"Take of scammony, hard extract of jalap, each *two ounces;* ginger root, *half an ounce.* Rub them separately to a very fine powder; then mix."

PULVIS SCAMMONII COMPOSITUS, Edin. *Compound Powder of Scammony.*

"Take of scammony, supertartrate of potassa, of each *equal parts.* Rub them together to a very fine powder."

Syn. Poudre de Scammonée composée (*F.*).

These powders, although agreeing in name, differ very considerably in their nature. In the first, the activity and the stimulating quality of the scammony are increased by the jalap, while the griping effect of the mixture is in some degree obviated by the ginger. In the second, the addition of the bitartrate of potassa detracts from the violence of the operation of the scammony, and renders it less irritating; although, at the same time, more certain. The dose of the first is from grs. x. to grs. xx.; that of the second, from grs. x. to ʒss. They are chiefly used in hydropic and worm cases.

PULVIS SCILLÆ, Dub. *Powder of Squill.*

"Let squill roots (bulbs), freed from their membranous integuments and cut in transverse slices, be dried upon a sieve with a low degree of heat; and then reduce them to powder, which must be preserved in well-stopped glass phials."

PULVIS SPONGIÆ USTÆ, Dub. *Powder of burnt Sponge.*

"Let sponge cut into small pieces, be beaten so as to free it from little stones; then burn it in a covered iron vessel, until it becomes black and friable; finally, reduce it to powder."

PULVIS ALUMINIS COMPOSITUS, Edin. *Compound Powder of Alum.*

"Take of sulphate of alum, *four parts;* kino, *one part.* Rub them together to a fine powder."

This is a powerful astringent powder, and is sometimes used internally in menorrhagia and diarrhœa; but is more generally employed as an external application. The dose is from grs. x. to grs. xv.; but it must be taken in the dry state, as the kino is decomposed by the alum, when a fluid vehicle is employed."

PULVIS TRAGACANTHÆ COMPOSITUS, Lond. *Compound Powder of Tragacanth.*

"Take of tragacanth, powdered, acacia, powdered, starch, of each *an ounce and a half;* sugar, *three ounces.* Powder the starch and the sugar together; then add the tragacanth and the acacia, and mix the whole together."

Syn. Poudre composée de Tragacanthe (*F.*), Tragacanthe Gummi pulver (*G.*) Polvere di Tragacanta composta (*I.*).

The starch might well be omitted in this powder, as it is insoluble in cold water. The powder is efficaciously used as a demulcent in hectic fever, and to allay the tickling cough of catarrh: in gonorrhœa and strangury it is given combined with nitre, and in dysentery with ipecacuanha powder. The dose is from ʒss. to ʒiij. mixed in water, or any bland fluid.

PULVIS PRO CATAPLASMATE, Dub. *Powder for Cataplasms.*

"Take of linseed oil cake, *one part;* oatmeal, *two parts.* Mix."

An excellent material for making poultices.

SPIRITUS.

Spirits.

Under this title are placed alcohol and spirituous solutions of vegetable matters, formed by simple mixture, by maceration, and by distillation. They are uniform, transparent, unchanging solutions, containing in general a large proportion of volatile oil; and when well prepared, are free from empyreuma. Pure alcohol is more volatile than many of the volatile oils, which do not therefore rise in distillation with it; and, consequently, proof or distilled spirit is employed. As medicinal agents the spirits are stimulant and cordial; but sometimes bad habits are acquired from their continued use. They are employed to cover the taste and flavour of disagreeable medicines, and to make some which are apt to produce nausea sit light upon the stomach.

ALCOHOL, Lond. *Alcohol.*

"Take of rectified spirit, *a gallon;* chloride of calcium, *a pound.* Put the chloride of calcium into the spirit, and when it is dissolved, let seven pints and five fluid ounces be distilled."

Alcohol, Dub. *Alcohol.*

"Take of rectified spirit of wine, *a gallon;* pearl ashes, dried, and still hot, *three pounds and a half;* muriate of lime, dried, *a pound.* Mix the spirit and the kali; add the pearl ashes, previously reduced to powder, and digest the mixture for seven days in a closed vessel, frequently shaking it; then pour off the spirit; mix with it the muriate of lime; and lastly, distil with a moderate heat, until the residue begin to thicken. The specific gravity of this spirit is to that of distilled water as ·810 to 1·000."

Syn. Alcohol (*F.*), Höchst rektifizirter Weingiest (*G.*), Alcoole (*I.*).

THE following Table, drawn up by Lowitz, with an additional column by Dr. Thomson, shows the Specific Gravity of different Mixtures of pure Alcohol of a Specific Gravity ·791, and Distilled Water, at the temperature of 60° and 68° of Fahrenheit.

100 parts by weight.		Sp. Gravity.		100 parts by weight.		Sp. Gravity.		100 parts by weight.		Sp. Gravity.	
Alco.	Wat.	at 68°	at 60°	Alco.	Wat.	at 60°	at 60°	Alco.	Wat.	at 60°	at 60°
100	—	791	796	66	34	877	880	32	68	952	955
99	1	794	798	65	35	880	883	31	69	954	957
98	2	797	801	64	36	882	886	30	70	956	985
97	3	800	804	63	37	885	889	29	71	957	960
96	4	803	807	62	38	887	891	28	72	959	962
95	5	805	809	61	39	889	893	27	73	961	963
94	6	808	812	60	40	892	896	26	74	963	965
93	7	811	*815	59	41	894	898	25	75	965	967
92	8	813	817	58	42	896	900	24	76	966	968
91	9	816	820	57	43	899	903	23	77	968	970
90	10	818	822	56	44	901	904	22	78	970	972
89	11	821	825	55	45	903	906	21	79	971	973
88	12	823	827	54	46	905	908	20	80	973	974
87	13	826	830	53	47	907	910	19	81	974	975
86	14	828	832	52	48	909	912	18	82	976	
85	15	831	†835	51	49	912	915	17	83	977	
84	16	834	838	50	50	914	917	16	84	978	
83	17	836	840	49	51	917	920	15	85	980	
82	18	839	843	48	52	919	922	14	86	981	
81	19	842	846	47	53	921	924	13	87	993	
80	20	844	848	46	54	923	926	12	88	985	
79	21	847	851	45	55	925	928	11	89	986	
78	22	849	853	44	56	927	‡930	10	90	987	
77	23	851	855	43	57	930	933	9	91	988	
76	24	853	857	42	58	932	§935	8	92	981	
75	25	856	860	41	59	934	937	7	93	998	
74	26	859	863	40	60	936	939	6	94	992	
73	27	861	865	39	61	938	941	5	95	991	
72	28	863	867	38	62	940	943	4	96	995	
71	29	866	870	37	63	942	945	3	97	997	
70	30	868	871	36	64	944	947	2	98	998	
69	31	870	874	35	65	946	949	1	99	999	
68	32	872	875	34	66	948	951	—	100	1000	
67	33	875	879	33	67	950	953				

* Alcohol of the Lond. and the Dub. Pharm.
† Ditto (*Edin.*), rectified spirit (*Lond.*).
‡ Proof spirit (*Lond. Dub.*)
§ Proof spirit (*Edin.*).

TABLE, extracted from the Tables of Mr. Gilpin, showing the Real Specific Gravity of different mixtures of Spirit and Water at every 5° of temperature from 50° to 70°.[1] The standard spirit employed was of the specific gravity 0·825; or contained 89 pure alcohol, and 11 water, in 100 parts.

Proportions by weight of		Real Specific Gravity.				
Spirit.	Water.	at 50°.	at 50°.	at 60°.	at 65°.	at 70°.
100	—	·82977	·82736	·82500	·82262	·82023
100	5	·84076	·83834	*·83599	·83362	·83124
100	10	·85042	·84802	·84568	·84334	·84092
100	15	·85902	·85664	·85430	·85193	·84951
100	20	·86676	·86441	·86208	·85975	·85736
100	25	·87384	·87150	·86918	·86680	·86415
100	30	·88030	·87796	·87569	·87337	·87105
100	35	·88626	·88393	·88169	·87938	·87705
100	40	·89174	·88945	·88720	·88490	·88254
100	45	·89684	·89458	·89232	·89006	·88773
100	50	·90160	·89933	·89707	·89479	·89252
100	55	·90596	·90367	·90144	·89920	·89695
100	60	·90997	·90768	·90549	·90328	·90104
100	65	·91370	·91144	·90927	·90707	·90484
100	70	·91723	·91502	·91227	.91066	·90847
100	75	·92051	·91837	·91622	.91400	·91181
100	80	·92358	·92145	·91933	·91715	·91493
100	85	·92647	·92436	·92215	·92010	·91793
100	90	·92919	·92707	·92499	·92283	·92069
100	95	·93177	·92960	·92758	·92546	·92333
100	100	·93419	·93208	†·93002	·92794	·92580
100	95	·93658	·93462	·93247	·93040	·92828
100	90	·93897	·93696	‡·93493	·93285	·93076
100	85	·94149	·93948	·93749	·93546	·93337
100	80	·94414	·94213	·94018	·93822	·93616
100	75	·94683	·94486	·94296	·94099	·93898
100	70	·94958	·94767	·94579	·94388	·94193
100	65	·95243	·95087	·94876	·94689	·94500
100	60	·95534	·95467	·95181	·95000	·94813
100	55	·95831	·95662	·95493	·95318	·95139
100	50	·96126	·95966	·95804	·95635	·95469
100	45	·96420	·96262	·96122	·95962	·95802
100	40	·96708	·96595	·96437	·96288	·96143
100	35	·96995	·96277	·96752	·96620	·96484
100	30	·97284	·97181	·97074	·96959	·96836
100	25	·97589	·97800	·97410	·97309	·97203
100	20	·97920	·97887	·97771	·97688	·97596
100	15	·98293	·98289	·98176	·98106	·98028
100	10	·98745	·98702	·98654	·98594	·98527
100	5	·99316	·99284	·99244	·99194	.99134

[1] *Phil. Trans.* for 1794, pp. 320—370.

* Alcohol (*Edin.*), rectified spirit (*Lond.*). † Proof spirit (*Lond. Dub.*)

‡ Proof spirit (*Edin.*).

Rectified spirit, of the specific gravity of 835°, contains about fifteen per cent. of water; and to free it from this is the intention of the above processes. The affinity of carbonates, alkalies, and chloride of calcium, for water is so much greater than that of spirit, that the water which the rectified spirit contains is attracted by these substances, and prevented from rising with the spirit during the distillation, by which means the alcohol comes over in a highly concentrated state. By means of chloride of calcium, Dr. Black obtained alcohol of the specific gravity of 800°; and Richter procured it so low as 0·796, in the temperature of 60° Fahrenheit[1], at which degree of concentration it may be regarded absolute as alcohol, or alcohol nearly free from water. The alcohol of the pharmacopœias, therefore, is not free from water, but contains about seven per cent. of water. It is, however, sufficiently concentrated for all the purposes of pharmacy.

Qualities. — Alcohol chymically combines with water: the bulk of the resulting mixture is less and its specific gravity greater than the mean of the two liquids before admixture; and much caloric is evolved. It is highly inflammable, burning with a pale yellowish blue flame, the colour varying according to the strength of the alcohol: a blue flame indicates the strongest alcohol. During its combustion, water and carbonic acid are formed, the quantity of the water exceeding that of the alcohol consumed. The alcohol of the pharmacopœias boils at 176°; and as its boiling point is higher the more water it contains, its strength may be known by the degree at which it boils; allowing for the atmospheric pressure under which it is tried. In vacuo, it boils at 56°. According to Saussure's experiments, it is a compound of carbon 52·17, oxygen 34·79, and hydrogen 13·4 in 100 parts of water[2], or it consists of 2 equiv. of carbon $=12{\cdot}24+3$ of hydrogen $=3+1$ of oxygen $=8$, making the equivalent $=23{\cdot}24$ (C^2H^3O). It cannot be frozen by any known degree of cold. It dissolves about 60 parts of sulphur, when both the alcohol and the sulphur are in a state of vapour. It dissolves, also, the carbonic and boracic acids, pure ammonia, soda, and potassa; volatile oils, resins, and gum-resins; soaps, camphor, sugar, extractive, and the vegetable alkaloids. As a pharmaceutical agent, alcohol, both in its pure and diluted state, is of the utmost importance.

Officinal preparation.—*Tinctura Acetatis Ferri cum Alcohole,* D.

SPIRITUS AMMONIÆ[3], Lond. *Spirit of Ammonia.*

"Take of hydrochlorate of ammonia, *ten ounces;* carbonate

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[1] *Crell's Annals,* 1796, ii. 211.
[2] *Trans. of the Pharm.* p. 315.
[3] Spiritus salis Ammoniaci dulcis, P. L. 1745.

of potassa, *sixteen ounces;* rectified spirit, water, each *three pints.* Mix, and distil over three pints."

ALCOHOL AMMONIATUM, Edin. *Ammoniated Alcohol.*

"Take of alcohol (835), *thirty-two ounces;* lime, recently burnt, *twelve ounces;* muriate of ammonia, *eight ounces;* water, *six ounces.* From these ammoniated alcohol is prepared exactly in the same manner as water of ammonia."

SPIRITUS AMMONIÆ, Dub. *Spirit of Ammonia.*

"Take of rectified spirit, *three pints;* carbonate of ammonia, rubbed to a powder, *three ounces aud a half.* Mix them, and dissolve the salt with a moderate heat; then filter the solution.

Syn. Alcohol Ammoniacale (*F.*), Gristiger Ammonium liquor (*G.*), Alcoole Ammoniato (*I.*).

In the London process, the hydrochlorate of ammonia is decomposed by the carbonate of potassa, the alkali of which attracts the hydrochloric acid, while the ammonia is extricated in the state of a carbonate, is volatilised, and readily combines with the alcohol; chloride of potassium remains in the retort. A portion of carbonate of ammonia also sublimes, and remains undissolved in the distilled product. The Dublin process is simple and elegant.

The spirit properly prepared has the pungent odour and acrid taste of ammonia, with which it coincides in its medicinal properties. It is used chiefly for pharmaceutical purposes.

Officinal preparations.—*Spiritus Ammoniæ compositus,* L. E. D. *Spiritus Ammoniæ fœtidus,* L. E. D. *Tinctura Castorei composita,* E. *Tinctura Guaiaci composita,* E. *Tinctura Opii ammoniata,* E.

SPIRITUS AMMONIÆ AROMATICUS[1], Lond. *Aromatic Spirit of Ammonia.*

"Take of hydrochlorate of ammonia, *five ounces;* carbonate of potassa, *eight ounces;* cinnamon, bruised, cloves, bruised, of each *two drachms;* lemon-peel, *four ounces;* rectified spirit, water, each *four pints.* Mix, and distil six pints."

ALCOHOL AMMONIATUM AROMATICUM, Edin. *Aromatic ammoniated Tincture.*

"Take of ammoniated alcohol, *eight ounces;* volatile oil of rosemary, *a drachm and a half;* volatile oil of lemons, *a drachm.* Mix them so as to dissolve the oils."

SPIRITUS AMMONIÆ AROMATICUS, Dub. *Aromatic Spirit of Ammonia.*

"Take of spirit of ammonia, *two pints;* essential oil of lemons, *two drachms;* nutmegs, bruised, *half an ounce;* macerated cinnamon bark, bruised, *three drachms,* in a covered vessel, for three days, frequently shaking the vessel; then distil *a pound and a half.*"

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[1] Spiritus volatilis aromaticus, P. L. 1748. Spiritus salis volatilis oleosus P. L. 1720. Spiritus ammoniæ compositus, P. L. 1787.

For these latter preparations it is necessary that the oils be pure; for if they contain fixed oil, as is often the case with the volatile oils imported into this country, the mixture is rendered turbid and coloured. It is turbid also when prepared with pure oils, if the spirit of ammonia ordered by the Dublin college contain any carbonate of ammonia, in which case it is necessary to distil the mixtures.

Medical properties and uses. — This spirit is a useful stimulant in languors and flatulent colic; the oils render it more grateful to the stomach than the simple spirit of ammonia. The dose is from f ʒ ss. to f ʒ j., in any convenient vehicle.

Officinal preparations. — *Tinctura Guaiaci composita,* L. D. *Tinctura Valerianæ composita,* L. D.

SPIRITUS AMMONIÆ FŒTIDUS[1], Lond. *Fœtid Spirit of Ammonia.*

"Take of hydrochlorate of ammonia, *ten ounces;* carbonate of potassa, *sixteen ounces;* rectified spirit, water, each *three pints;* assafœtida, *five ounces.* Mix; then, with a slow fire, distil three pints."

Dublin.

"Take of spirit of ammonia, *two pints;* assafœtida, *one ounce and a quarter.* Macerate for three days, in a covered vessel, with frequent agitation; then, by a gentle fire, distil one pint and a half into a cold receiver."

TINCTURA ASSAFŒTIDÆ AMMONIATA, Edin. *Ammoniated Tincture of Assafœtida.*

"Take of ammoniated alcohol, *eight ounces;* assafœtida, *half an ounce.* Digest them in a close vessel for twelve hours; then distil eight ounces by the heat of boiling water."

In these processes, the fetid volatile oil of the gum-resin is dissolved in the spirit of ammonia, and its odour and flavour communicated to it; but very little else is taken up. Its medicinal properties are not different from those of the preceding spirit; and its dose is the same. It acquires colour from age.

SPIRITUS ANISI, Lond. *Spirit of Anise-seed.*

"Take of anise-seeds, bruised, *ten ounces;* proof spirit, *a gallon;* water, *two pints.* Mix; then distil, by a gentle fire, a gallon."

SPIRITUS ANISI COMPOSITUS, Dub. *Compound Spirit of Anise-seed.*

"Take of anise-seeds, bruised, angelica seeds, bruised, of each *half a pound;* proof spirit, *a gallon;* water, *sufficient to prevent empyreuma.* Distil one gallon."

Syn. Alcohol d'Anis (*F.*), Alcoole Anisato (*I.*).

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1 Spiritus volatilis fœtidus, P. L. 1745.

These are pleasant carminatives, useful in flatulent colic and similar affections. The dose is from f ʒ ss. to f ʒ iv. in water.

SPIRITUS ARMORACIÆ COMPOSITUS, Lond. Dub. *Compound Spirit of Horse-radish.*

"Take of horse-radish, sliced, dried orange-peel, of each *twenty ounces;* nutmegs, bruised, *five drachms;* proof spirit, *a gallon;* water, *two pints.* Mix, and distil a gallon by a gentle fire."

This spirit was formerly used as an antiscorbutic, but it possesses little value as such; and is now chiefly used in dropsies attended with much debility. The dose is from f ʒ ij. to f ʒ iv., combined with infusion of foxglove or of juniper.

SPIRITUS CAMPHORATUS, Dub. *Camphorated Spirit.*

"Take of camphor, *one ounce;* rectified spirit, *eight ounces.* Mix, and dissolve the camphor."

Syn. Alcohol Camphré (*F.*), Kampfer Spiritus (*G.*), Alcoole Canforato (*I.*).

The strength of the spirit renders this preparation unfit to be given internally; and the addition of water separates the camphor. It is a useful external application to chilblains, and in chronic rheumatism, paralytic numbness, and gangrene.

SPIRITUS CARUI, Lond. Dub. *Spirit of Carraway.*

"Take of carraway, bruised, *twenty-two ounces* (*a pound,* Dub.); proof spirit, *a gallon;* water, *two pints.* Mix; then distil a gallon by a gentle fire."

SPIRITUS CARI CARUI, Edin. *Spirit of Carraway.*

"Take of carraway-seeds, bruised, *half a pound;* proof spirit, *nine pounds.* Macerate for two days in a close vessel; then add a sufficient quantity of water to prevent empyreuma, and distil nine pounds."

Syn. Alcoole con Carvi (*I.*).

A useful carminative, and adjunct to griping purgatives.

SPIRITUS CINNAMOMI, Lond. *Spirit of Cinnamon.*

"Take of oil of cinnamon, *two drachms;* proof spirit, *a gallon;* water, *a pint.* Mix; then distil a gallon by a slow fire."

SPIRITUS LAURI CINNAMOMI, Edin. Dub. *Spirit of Cinnamon.*

"To be prepared with a pound of cinnamon bark, in the same manner as the spirit of carraway."

This spirit is an agreeable cordial in languor and debility. The dose is from f ʒ j., to f ʒ iv. in any convenient vehicle.

Officinal preparation. — *Infusum Digitalis,* L.

SPIRITUS JUNIPERI COMPOSITUS, Lond. Dub. Edin. *Compound Spirit of Juniper.*

"Take of juniper fruit, bruised, *fifteen ounces;* carraway, bruised, fennel, bruised, each *two ounces;* proof spirit, *a gallon* (*nine pounds*, Edin.); water, *two pints.* Mix (macerate two days, *Edin. Dub.*); then distil a gallon (nine pounds, *Edin.*) by a gentle heat."

This spirit is a grateful and useful addition to infusions of foxglove, and other diuretics, in dropsy.

SPIRITUS LAVANDULÆ, Lond. *Spirit of Lavender.*

"Take of fresh lavender, *two pounds and a half;* rectified spirit, *a gallon;* water, *two pints.* Mix; then distil a gallon by a gentle heat."

Dublin.

"Take of fresh flowers of lavender, *two pounds;* proof spirit, *a gallon;* water, *sufficient to prevent empyreuma.* Distil five pints by a moderate fire."

SPIRITUS LAVANDULÆ SPICÆ, Edin. *Spirit of Lavender.*

"Take of fresh flowers of lavender, *two pounds;* alcohol, *eight pounds.* Distil, with the heat of a water bath, seven pounds."

Syn. Teinture alcoholique de Lavande (*F.*), Lavendel-spiritus (*G.*).

The oil of lavender is sufficiently volatile to be brought over with rectified spirit, which is also required to extract all the oil from the flowers; for this reason, the Dublin process produces a spirit less highly impregnated with the oil. Spirit of lavender is chiefly used as a perfume.[1]

Officinal preparations.—*Tinctura Lavandulæ compositus,* L. E. D. *Linimentum Camphoræ compositum,* L.

SPIRITUS LAVANDULÆ COMPOSITUS, Edin. Dub. *Compound Spirit of Lavender.*

"Take of spirit of lavender, *three pounds;* spirit of rosemary, *one pound;* cinnamon bark, bruised, *an ounce;* nutmegs, bruised, *two drachms;* red saunders-wood, rasped, *three drachms.* Macerate seven days, and strain."

The addition of these aromatics to the spirit of lavender renders it a grateful cordial and stimulant, useful in languors and faintings, and as an adjunct to tonic and stomachic infusions. Its dose is from ♏xxx. to f ʒ ij.

SPIRITUS MENTHÆ PIPERITÆ, Lond. Edin. *Spirit of Peppermint.*

"Take of oil of peppermint, *three drachms;* proof spirit, *a gallon;* water, *a pint.* Mix; then distil, with a slow fire, one gallon."

Syn. Teinture alcoholique de Menthe Poivrée (*F.*), Alcoole con Menta piperitide (*I.*).

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[1] Lavender water is seldom, as Mr. Brande remarks, a distilled spirit, and each manufacturer has his own recipe. The following is said to be the most approved:—Take of rectified spirit of wine, *five gallons;* essential oil of lavender, *twenty ounces;* essential oil of bergamotte, *five ounces;* essence of ambergris, *half an ounce.* Mix.

A useful carminative in nausea and flatulence, and as an adjunct to purgative remedies.

SPIRITUS MENTHÆ VIRIDIS, Lond. *Spirit of Spearmint.*

SPIRITUS MENTHÆ PULEGII, Lond. *Spirit of Pennyroyal.*

These spirits are prepared in the same manner as the spirit of peppermint, and are given in the same cases.

SPIRITUS MYRISTICÆ, Lond. SPIRITUS MYRISTICÆ MOSCHATÆ, Edin. SPIRITUS NUCIS MOSCHATÆ, Dub. *Spirit of Nutmeg.*

"Take of nutmegs, bruised, *two ounces and a half;* proof spirit, *a gallon* (*nine pounds,* Edin.); water, *a pint.* Mix; then distil a gallon (nine pounds, *Edin.*) by a gentle heat."

SPIRITUS PIMENTÆ, Lond. SPIRITUS PIMENTO, Dub. *Spirit of Pimenta.*

Prepared in the same manner as the spirit of nutmeg.

SPIRITUS MYRTI PIMENTÆ, Edin. *Spirit of Pimenta.*

"It is to be prepared with *half a pound* of bruised pimenta berries, in the same manner as spirit of carraway."

A useful carminative in flatulent colic, atonic gout, and dyspepsia.

SPIRITUS ROSMARINI, Lond. *Spirit of Rosemary.*

"Take of rosemary, *two pounds;* rectified spirit, *a gallon;* water, *a gallon.* Mix; then distil a gallon in a gentle heat."

SPIRITUS RORISMARINI OFFICINALIS, Edin. *Spirit of Rosemary.*

"Take of fresh rosemary tops, *two pounds;* alcohol (spec. grav. 835), *eight pounds.* Draw off seven pounds by distillation in a water bath."

SPIRITUS RORISMARINI, Dub. *Spirit of Rosemary.*

"Take of fresh rosemary tops, *a pound and a half;* proof spirit, *a gallon.* Distil five pints by a moderate fire."

Syn. Esprit de Rosmarin (*F.*), Rosmarien-spiritus (*G.*), Alcoole Rosmarinato (*I.*).

Oil of rosemary is sufficiently volatile to rise in distillation with rectified spirit, which the Edinburgh College has therefore ordered to be used. It is a fragrant perfume, and is chiefly used in the undermentioned preparations.[1]

Officinal Preparations.—*Linimentum Saponis compositum,* L.E.D. *Spiritus Lavandulæ compositus,* L. E. D.

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[1] The following are the best recipes for *Hungary Water* and *Eau de Cologne.*

Hungary Water.

Take of fresh rosemary in blossom, *four pounds;* fresh sage in blossom, *eight ounces;* ginger root in blossom, *two ounces.* Cut, bruise, and pour upon them

PRÆPARATA E SULPHURE.

PREPARATIONS OF SULPHUR.

PURE SULPHUR is generally regarded as a simple substance. According to Sir H. Davy's experiments, it is a triple compound of oxygen, hydrogen, and a peculiar, unknown base: but late experiments have not tended to confirm this opinion. It unites readily with metals, forming compounds which have been denominated *Sulphurets*. These are formed by the fusion of the substances in a dry state; and the compounds require to be carefully preserved from the atmosphere, as they attract moisture from it, deliquesce, and are decomposed. When, however, the union of sulphur and alkaline or earthy bases is effected by means of water, the products are not simple *sulphurets*, but sulphurets combined with sulphureted hydrogen, and have been named *Hydrogureted Hydrosulphurets*. They are equally susceptible of decomposition by exposure to the air as the sulphurets.

OLEUM SULPHURETUM, Edin. *Sulphureted Oil.*

"Take of olive oil, *eight parts*; sublimed sulphur, *one part*. Boil them with a gentle heat in a large iron vessel, stirring constantly, until they unite."

Syn. Huile de sulphur (*F.*), Oleo sulfurato (*I.*).

Sulphur is soluble in many fixed oils, but particularly so in linseed oil. This combination was formerly termed a *balsam*, and was sometimes united with other substances; as, for instance, the oil of aniseed, in forming the *anisated balsam of sulphur*. Great attention is required in these processes to prevent the mixture from boiling over, or its vapour from catching fire. If either of these accidents occur, the combustion may be stopped, by instantly covering the pot with a close lid. The iron pot should be sufficient to contain thrice the bulk of the ingredients.

Qualities. — The odour of this solution of sulphur is extremely fetid, and the taste acrid. It is of a reddish-brown colour; has a thick, viscid consistence; and, when heated, emits sulphureted hydrogen. When it is much concentrated, the sulphur crystallises in octahedrons.

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twelve pints of rectified spirit and two pints of water. Distil, with a slow fire, eleven pints.

Eau de Cologne.

Take of alcohol, *one pint*; oil of bergamotte, oil of orange-peel, oil of rosemary, of each *one drachm*; bruised cardamom seeds, *one drachm*; orange-flower water, *one pint*. Distil, from a water bath, *one pint*.

Medical properties and uses. — Sulphureted oil is stimulant, and externally detergent. It was formerly, when regarded as balsamic, recommended in catarrh, asthma, and phthisical affections; but its internal use is now properly exploded. It is sometimes still externally applied for cleansing foul ulcers. The dose was from ♏ v. to ♏ xxx. taken in water.

SULPHUR SUBLIMATUM LOTUM, Edin. *Washed sublimed Sulphur.*

"Take of sublimed sulphur, *one part;* water, *four parts.* Boil the sulphur, for a short time, in the water; then pour off this water, and by repeated affusions of cold water, wash away all the acid; lastly, dry the sulphur."

Dublin.

"Let warm water be poured upon sublimed sulphur, and the washing be repeated as long as the water employed shall appear acid. This is known by means of litmus. Dry the sulphur on bibulous paper."

Syn. Soufre lavé (*F.*), Geevaschner Schwefel (*G.*), Zolfo lavato (*I.*).

In subliming sulphur, a small portion of it is apt to be acidified by attracting the oxygen of the heated air of the vessels, or the chamber in which the process is conducted. The quantity is, however, very minute, and is completely removed by the above processes. The sulphur does not afterwards undergo any change from exposure to the air at the ordinary temperature of the atmosphere. The equivalent of sulphur is 16·1.

HYDROSULPHURETUM AMMONIÆ, Edin. *Hydrosulphuret of Ammonia.*

"Take of water of ammonia, sulphuret of iron, of each *four ounces;* muriatic acid, *eight ounces;* water, *two pounds and a half.* Pour the acid, previously mixed with the water, on the sulphuret, and transmit the gas evolved through the water of ammonia. Preserve the solution in well-stopped phials.

AMMONIÆ HYDROSULPHURETUM, Dub. *Hydrosulphuret of Ammonia.*

"Take of sulphuret of iron, in coarse powder, *five parts;* sulphuric acid, *seven parts;* water, *thirty parts;* water of caustic ammonia, *four parts.* Put the sulphuret into a retort, and gradually pour over it the acid, diluted with water; and in a proper apparatus transmit the gas evolved from it through water of ammonia. Towards the conclusion of the operation apply a moderate heat to the matrass."

The addition of the diluted hydrochloric acid, ordered in the Edinburgh process by oxidising the iron, enables it to decompose the water, the hydrogen of which, dissolving a part of the sulphur, escapes in the form of sulphureted hydrogen gas, which combines, at a low temperature, with the ammonia of the solution through which it is made to pass. Mr. Cruikshank[1] advises the sulphuret of iron to be prepared "by raising a piece of iron in a smith's forge to a white heat, and then rubbing it against the end of a roll of sulphur; the iron at this temperature immediately combines with the sulphur, and forms globules of pyrites (*sulphuret*), which should be received into a vessel filled with water: these globules are to be reduced to powder, and introduced into the proof, to which a sufficient quantity of the muriatic acid is to be added."

Qualities. — Hydrosulphuret of ammonia is of a green colour; has a very fetid odour, and an acrid, disagreeable taste. It is decomposed by the acids.

Medical properties and uses. — This preparation is a powerful sedative, lessening the action of the stomach and of the arterial system in a remarkable degree; and even in moderate doses producing sickness, vomiting, and vertigo. It was first proposed as a remedy by Mr. Cruikshank, with the view of diminishing the morbid appetite and powerful action of the digestive organs, which attend those labouring under diabetes mellitus; and its subsequent use has been confined to the treatment of that disease. The dose, to an adult, should not at first exceed ♏ v. or ♏ vj., given in a large tumbler of water, three or four times a day; and the number of drops should be gradually increased, until a slight degree of giddiness take place, when any further increase must be stopped.

SYRUPI.

Syrups.

These are saturated solutions of sugar in water, either simple, or united with some vegetable principle, with the view either to colour, flavour, or medicinal virtue: but for the last intention this is perhaps the worst of all forms for obtaining the medicinal qualities of substances; and, therefore, as syrups seldom possess much activity, they are chiefly employed to render more active remedies palatable. Upon the whole, however, they are not well adapted even for this purpose, few persons thinking that sweetness renders a nauseous drug more

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[1] *Rollo on Diabetes and Lues Venera.*

palatable; and, with a few exceptions, they might be properly rejected from the pharmacopœias.

In making syrups, refined sugar should always be employed, or, if coarser sugar be used, the syrup should be clarified, by beating to a froth the white of eggs, with a small portion of water, and adding it to the solution of sugar and water before boiling them. The albumen coagulates as the syrup boils, and, involving the impurities which the sugar contained, rises to the surface in the form of a scum, which must be carefully removed. If too much sugar be used, or if the syrup be too long boiled, the sugar soon crystallises; and this crystallisation, by attracting the sugar from the remainder of the syrup, weakens it so much that it soon ferments and spoils: but if the quantity of the sugar be in too small proportion, and the boiling not sufficient, the syrup also quickly ferments, and becomes acescent. The most certain test of the proper consistence of a syrup is its specific gravity, which, when cold, should be 1·385. But, however well prepared, syrups are apt to ferment when kept in a high temperature; therefore, the following direction relative to their preservation is given by the London College: —

"Let syrups be preserved in a place the temperature of which never exceeds 55°."[1]

SYRUPUS, Lond. *Syrup.*

"Take of sugar, *ten pounds;* water, *three pints.* Dissolve the sugar in the water by means of a gentle heat.

SYRUPUS SIMPLEX, Edin. Dub. *Simple Syrup.*

"Take of purified sugar, *fifteen parts;* water, *eight parts.* Dissolve the sugar in the water by a gentle heat, and boil it a little, so as to form a syrup."

SYRUPI, Dub. *Syrups.*

"In making syrups, for which neither the weight of the sugar nor the mode of dissolving it is specified, the following rule is to be observed: —

"Take of refined sugar, reduced to a fine powder, *twenty-nine ounces;* the liquor prescribed, *one pint.* Add the sugar by degrees, and digest with a moderate heat, in a close vessel, until it is dissolved, frequently stirring it; set the solution aside for twenty-four hours, take off the scum, and pour off the syrup from the feces, if there be any."

Syn. Sirop (*F.*), Einfacher syrup (*G.*), Sciroppo (*I.*).

Simple syrup, when properly prepared, should be inodor-

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[1] Dr. Macculloch informs us, that by the addition of a small quantity of *sulphate of potassa*, or of the *chlorate of potassa*, which is a tasteless salt, the fermentation of syrups may be effectually prevented. See *Essay on Wine.*

ous, sweet, thickish, nearly colourless, and perfectly transparent.

SYRUPUS ACETI, Edin. *Syrup of Vinegar.*

"Take of vinegar, *five parts;* refined sugar, *seven parts.* Boil, so as to form a syrup."

Syn. Sirop d'Acide acétique (*F.*), Sciroppo acetico (*I.*).

This syrup is very liable to undergo decomposition: it should therefore be made in small quantities only at a time.

It may be used for sweetening barley-water or gruels, in fevers and inflammatory diseases.

SYRUPUS ALTHÆÆ, Lond. Dub. *Syrup of Marshmallows.*

"Take of fresh marsh-mallow root, bruised, *eight ounces;* sugar, *two pounds;* water, *four pints.* Boil down the water with the root to one half, and express the liquor when it is cold. Set it aside for twenty-four hours, that the feces may subside; then decant off the liquor, and, having added to it the sugar, boil down to a proper consistence."

SYRUPUS ALTHÆÆ OFFICINALIS, Edin. *Syrup of Marshmallows.*

"Take of fresh root of marsh-mallows, sliced, *one part;* water, *ten parts;* refined sugar, *four parts.* Boil the water with the root down to one half, and, expressing it strongly, strain. Put aside the strained liquor, and, when the feces have subsided, add to it the sugar; then boil so as to form a syrup."

Syn. Sirop d'Althea (*F.*), Althee syrup (*G.*), Sciroppo d'Altea (*I.*).

This is a solution of vegetable mucus and syrup, supposed to possess demulcent properties; but these are very trivial. Owing to the small proportion of sugar it contains, it very soon suffers spontaneous decomposition.

SYRUPUS AURANTII, Lond. *Syrup of Oranges.*

"Take of fresh orange-peel, *two ounces and a half;* boiling water, *a pint;* refined sugar, *three pounds.* Macerate the peel in the water for twelve hours in a covered vessel; then pour off the liquor, and add to it the sugar."

SYRUPUS CITRI AURANTII, Edin. *Syrup of Orange.*

"Take of the fresh peel of Seville oranges, *three ounces;* boiling water, *one pound and a half;* refined sugar, *three pounds.* Macerate the peel in the water in a covered vessel for twelve hours; then add the sugar to the strained liquor, and expose it to a gentle heat, so as to form a syrup."

SYRUPUS AURANTII, Dub. *Syrup of Orange.*

"Take of the fresh peel of Seville oranges, *eight ounces;* boiling water, *six pints.* Macerate for twelve hours in a covered vessel, and dissolve as much sugar in the filtered liquor as will form a syrup."

Syn. Sirop d'écorce d'Orange (*F.*), Pomeranzenschaleusyrup (*G.*), Sciroppo di Corteccia di Arancio (*I.*).

The quantity of water ordered by the Edinburgh College is too great; particularly as the application of a degree of heat sufficient to evaporate part of it would dissipate the flavour of the orange-peel, for which the syrup is valued. A syrup, equally agreeable and efficacious, may be made by adding f ℥ j. of tincture of orange-peel to a pint of simple syrup.

SYRUPUS COLCHICI AUTUMNALIS, Edin. *Syrup of Meadow Saffron.*

"Take of fresh meadow-saffron root (bulb), cut into thin slices, *one ounce;* distilled vinegar, *sixteen ounces;* refined sugar, *twenty-six ounces.* Macerate the root in the acid for two days, shaking the vessel occasionally; then expressing gently, strain the liquor, and to it add the sugar; lastly, boil a little, so as to form a syrup.

With the substitution of syrup for honey, this preparation is similar to the oxymel. The dose is f ʒ ij., increased gradually to f ℥ ss. or more.

SYRUPUS CROCI, Lond. *Syrup of Saffron.*

"Take of saffron, *ten drachms;* boiling water, *a pint;* sugar, *three pounds.* Macerate the saffron in the water for twelve hours, in a slightly covered vessel; then filter the liquor, and add to it the sugar."

Syn. Sirop de Safran (*F.*), Safransyrup (*G.*).

This syrup is cordial in a small degree; but it is chiefly valued on account of its beautiful colour.

SYRUPUS DIANTHI CARYOPHILLI, Edin. *Syrup of the Clove-pink.*

"Take of recent petals of the clove-pink, freed from their claws, *one part;* boiling water, *four parts;* refined sugar, *seven parts.* Macerate the petals in the water for twelve hours; then add the sugar to the strained liquor, and dissolve it with a gentle heat."

This syrup is valued for the rich colour and the agreeable flavour of the flowers, which it possesses in perfection when well prepared. Alkalies change the colour to green, and form a test of the genuineness of the syrup; as no such effect takes place with syrup, made of an infusion of cloves and coloured with cochineal, which is sometimes sold for it: but the one is as good for medicinal use as the other.

SYRUPUS LIMONUM, Lond. *Syrup of Lemon.*

"Take of lemon-juice, strained, *a pint;* sugar, *two pounds and a half.* Dissolve the sugar in the lemon-juice, with a gentle heat, then set aside for twenty-four hours: afterwards mix, scum, and decant the clear liquor from the dregs, if there be any."

SYRUPUS CITRI MEDICÆ, Edin. *Syrup of Lemon.*

"Take of lemon-juice, strained after the feces have subsided, *three parts;* refined sugar, *five parts.* Dissolve the sugar."

SYRUPUS LIMONIS, Dub. *Syrup of Lemon.*

"Take of expressed lemon-juice, *two pints.* As soon as the feces have subsided put it into a matrass, and immerse it in boiling water for a quarter of an hour: when cold, strain it through a sieve, and make it into a syrup."

Syn. Zitronensaftsyrup (*G.*).

This is an agreeable syrup for acidulating barley-water or other drinks in febrile diseases. It is also an useful adjunct to gargles in inflammatory sore-throat.

SYRUPUS MORI, Lond. *Syrup of Mulberry.*

"Take of strained mulberry-juice, *a pint;* sugar, *two pounds and a half.* Dissolve the sugar in the mulberry-juice in the manner ordered for syrup of lemons."

Syn. Maulbeer-syrup (*G.*).

This syrup is used for the same purposes as the syrup of lemons, and has besides the advantage of colour.

SYRUPUS PAPAVERIS, Lond. *Syrup of Poppy.*

"Take of the capsules of the poppy, *three pounds;* sugar, *five pounds;* boiling water, *five gallons.* Boil down the capsules in water to two gallons, and express strongly. Boil the strained liquor again down to four pints, and strain it while it is hot. Set it aside twelve hours that the feces may subside; then boil down the clear liquor to two pints, add the sugar, and dissolve it."

SYRUPUS PAPAVERIS SOMNIFERI, Edin. *Syrup of White Poppy.*

"Take of the capsules of the white poppy, dried and freed from the seeds, *one part;* boiling water, *fifteen parts;* refined sugar, *two parts.* Macerate the sliced capsules in the water for twelve hours; then boil until a third part only of the liquor remain; and, expressing strongly, strain the decoction. Boil the strained liquor to one half, and again strain it; lastly, having added the sugar, boil it for a short time, so as to form a syrup."

SYRUPUS PAPAVERIS SOMNIFERI, Dub. *Syrup of White Poppies.*

"Take of the capsules of the white poppy, gathered before they are ripe, dried, and freed from the seeds, *seventeen ounces;* boiling water, *two gallons.* Slice and bruise the capsules;

then pour over them the water, and macerate for twenty-four hours; express the liquor, and evaporate it by a gentle heat to two pints; and strain while it is hot. Set it aside twelve hours that the feces may subside; finally, add sugar to the clear liquor, that it may make a syrup."

Syn. Sirop de Pavot blanc (*F.*), Syrup von Weissen Mohn (*G.*), Sciroppo di Papaveri bianchi (*I.*).

The narcotic principle of the poppy (*meconate of morphia*) is taken up by the water, but it is very probable that any variation of the degree of heat necessary to produce the evaporation will alter considerably the nature of the extract, and, consequently, make the syrup differ in point of strength. It ferments more readily than most other syrups, but its narcotic property is augmented when it becomes ascescent. M. Chereau asserts, that the addition of 32 parts of sugar of milk to 1000 of this syrup, prevents the fermentation. One fluid ounce of it contains about one grain of extract.

Medical properties and uses. — Syrup of poppy is an useful anodyne for allaying the violence of cough, for easing pain, and procuring sleep in children's diseases: it should not be given to children when it is in a state of fermentation. The dose is from f ʒ j. to f ℥ j., according to the age of the patient.

SYRUPUS RHŒADOS, Lond. *Syrup of the Red Poppy.*

"Take of the petals of the red poppy, *a pound;* boiling water, *a pint;* sugar, *two pounds and a half.* To the water, heated in a water bath, add gradually the petals of the red poppy, stirring them occasionally, then, having removed the vessel, macerate for twelve hours; press out the liquor, and set it aside, that the impurities may subside; lastly, add the sugar, and dissolve it."

SYRUPUS PAPAVERIS RHŒADOS, Dub. *Syrup of the Red Poppy.*

"Take of the fresh petals of the red poppy, *a pound;* boiling water, *twenty fluid ounces.* Add the flowers gradually to the boiling water; then, having removed the vessel from the fire, macerate in a lower heat for twelve hours; express the liquor, and set it aside that the feces may subside; finally, let the sugar be added, so as to make a syrup."

Syn. Sirop de Coquelicot (*F.*), Klapprosen-syrup (*G.*).

By attending strictly to the directions of either of the above formulæ, the petals yield their fine rich colour, for which alone the syrup is valued.

SYRUPUS RHAMNI[1], Lond. Dub. *Syrup of Buckthorn.*

[1] Syr. de spina cervina, P. L. 1720. Syrupus spinæ cervinæ, P. L. 1787.

"Take of the fresh juice of buckthorn, *four pints* (*two pints and a half*, Dub.); ginger, sliced, pimenta, bruised, each *six drachms* (*two drachms*, Dub.); sugar, *four pounds*. Set apart the juice for three days that the feces may subside; then strain it. To a pint of the defecated juice add the ginger and pimenta; then macerate, by a gentle heat, for four hours, and strain. Boil the remainder of the juice down to a pint and a half; mix the liquors, and add the sugar, and dissolve it."

SYRUPUS RHAMNI CATHARTICI, Edin. *Syrup of Buckthorn.*

"Take of the clarified juice of ripe buckthorn berries, *two parts;* refined sugar, *one part.* Boil so as to form a syrup."

Of these two formulæ, that of the London College is to be preferred, as the addition of the ginger and allspice tends to cover the unpleasant taste of the buckthorn juice, and prevent the violent griping which it is apt to induce. It is a brisk cathartic; but owing to the unpleasantness of its operation, and the dryness of the mouth and fauces which it occasions, it is seldom used, except as a horse medicine. The dose is from f ℥ ss. to f ℥ j., drinking freely of tepid demulcent fluids during its operation.

SYRUPUS ROSÆ[1], Lond. Dub. *Syrup of the Rose.*

"Take of the petals of the damask rose, dried, *seven ounces;* sugar, *six pounds;* boiling water, *three pints.* Macerate the rose petals in the water for twelve hours, and strain. Evaporate the strained liquor, in a water bath, down to *two pints;* then add the sugar, and dissolve."

SYRUPUS ROSÆ CENTIFOLIÆ, Edin. *Syrup of Damask Roses.*

"Take of the fresh petals of the damask rose, *one part;* boiling water, *four parts;* refined sugar, *three parts.* Macerate the petals in the water for twelve hours; then add the sugar to the strained liquor, and boil, so as to form a syrup."

This syrup has none of the agreeable odour of the rose, but possesses a weak purgative property; on which account it is given as a laxative in very delicate habits, and to infants. The dose is from f ʒ ij. to f ʒ xij., or more.

SYRUPUS ROSÆ GALLICÆ, Edin. *Syrup of Red Roses.*

"Take of the petals of the red rose, dried, *one part;* boiling water, *nine parts;* refined sugar, *ten parts.* Macerate the petals in the water for twelve hours; then boil a little, and strain. Add the sugar to the strained liquor, and again boil a little, so as to form a syrup."

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[1] Syr. e rosis siccis, P. L. 1720. Syr. rosarum solutivus, P. L. 1745.

Syn. Sirop de Roses rouges (*F.*), Rosen syrup (*G.*), Sciroppo di Rose Rosse (*I*).

This syrup is a very weak astringent; and as such is added to astringent and stomachic infusions and gargles.

SYRUPUS SARZÆ, Lond. Dub. *Syrup of Sarsaparilla.*

"Take of sarsaparilla root, sliced, *sixteen ounces;* boiling water, *one gallon;* sugar, *fifteen ounces.* Macerate the sarsaparilla in the water for twenty-four hours; then boil down to *four pints,* and strain the liquor whilst it is hot; lastly, add the sugar, and evaporate to a proper consistence."

This is a trifling preparation, and of no use but as an adjunct to the decoction of sarsaparilla. It can be much better and more easily supplied by rubbing up a few grains of the extract with some simple syrup.

SYRUPUS SCILLÆ MARITIMÆ, Edin. *Syrup of Squill.*

"Take of vinegar of squill, *four parts;* refined sugar, powdered, *seven parts.* Dissolve the sugar by a gentle heat, so as to make a syrup."

Syn. Sirop acéteux de Scille (*F.*), Sciroppo di Squilla marino acetoso (*I.*).

The syrup has the same properties as the oxymel of squill. The dose is from f ʒj. to f ʒij., given in any aromatic distilled water.

SYRUPUS SENNÆ, Lond. *Syrup of Senna.*

"Take of senna leaves, *two ounces and a half;* fennel, bruised, *ten drachms;* manna, *three ounces;* sugar, *fifteen ounces;* boiling water, *a pint.* Macerate the senna and the fennel in the water, in a gentle heat, for an hour; strain the liquor; mix with it the manna and the sugar; and boil to a proper consistence."

SYRUPUS CASSIÆ SENNÆ, Edin. *Syrup of Senna.*

"Take of senna leaves, *two ounces;* boiling water, *a pound and a half;* burnt syrup, *eight ounces.* Macerate the leaves in the water, in a covered vessel, for four hours, and strain; then add the syrup, and boil with a gentle heat, until the whole acquire the consistence of the burnt syrup."

Dublin.

"Take of manna, refined sugar, of each, *a pound;* senna leaves, *half an ounce;* boiling water, *a pint.* Let the senna leaves be macerated in the water, in a covered vessel, for twelve hours; then dissolve the manna and the sugar in the strained liquor."

This syrup contains the purgative properties of the senna, and is chiefly intended for children.

SYRUPUS TOLUTANI[1], Lond. *Syrup of Tolu.*

[1] Syr. balsamicus, P. L. 1720.

"Take of balsam of Tolu, *ten drachms;* boiling water, *a pint;* refined sugar, *two pounds and a half.* Boil the balsam in the water for half an hour, in a close vessel, frequently stirring it, and strain the liquor when it is cold; then add the sugar, and dissolve it."

SYRUPUS TOLUIFERÆ BALSAMI, Edin. *Syrup of Tolu.*

"Take of simple syrup, *two pounds;* tincture of balsam of Tolu, *one ounce.* To the syrup, immediately after it is made, and before it is quite cold, add the tincture gradually, frequently stirring."

SYRUPUS BALSAMI TOLUTANI, Dub. *Syrup of Balsam of Tolu.*

"Take of syrup, recently prepared, *one pound and a half;* tincture of balsam of Tolu, *one ounce:* when the syrup is nearly cold, mix in it, by degrees, the tincture, by assiduously stirring it."

Syn. Sirop Balsamique (*F.*).

By following the London formula a more elegant and grateful syrup is obtained than that produced by the Edinburgh method: but the syrup ordered by the Edinburgh College is sufficient for the uses to which it is applied. It is whitish and turbid, owing to a partial decomposition of the tincture, which deposits its resin when mixed with the syrup. It is used to give a pleasant flavour to draughts and mixtures.

SYRUPUS VIOLÆ ODORATÆ, Edin. *Syrup of Violet.*

"Take of flowers of the odorous violet, *two parts;* boiling water, *eight parts;* refined sugar, *fifteen parts.* Macerate the flowers in the water for twenty-four hours, in a covered glass or glazed earthenware vessel; then strain without expression, and add the sugar."

SYRUPUS VIOLÆ, Dub. *Syrup of Violet.*

"Take of the fresh petals of the violet, *two pounds;* boiling water, *five pints.* Macerate for twenty-four hours; then strain the liquor through fine linen with expression, and add a sufficient quantity of sugar to make a syrup."

Syn. Sirop de Violettes (*F.*), Violen-syrup (*G.*), Sciroppo di Viole (*I.*).

This syrup has a deep blue colour, and a very agreeable flavour. The colour, however, which constitutes its chief value, is apt to suffer by keeping; and thence the syrup is often counterfeited with materials, the colour of which is more permanent, and which are more easily obtained. This fraud is easily detected by adding a little acid or alkali to a portion of the suspected syrup: if it be genuine the acid will change the blue colour to red, and the alkali to green; but if it be counterfeit these changes will not take place, except in the case of the juice of red cabbage being substituted for violets: but in this case the fraud is a very innocent one.

Medical properties and uses. — This syrup acts as a gentle laxative when given to infants; but it is chiefly used as a test of the presence of acids and alkalies.

SYRUPUS ZINGIBERIS, Lond. *Syrup of Ginger.*

"Take of ginger, sliced, *two ounces;* boiling water, *a pint;* sugar, *two pounds.* Macerate the ginger root in the water for four hours, and strain; then add the sugar, so as to make a syrup."

Dublin.

"Take of ginger root, bruised, *four ounces;* boiling water, *three pints.* Macerate for twenty-four hours; then strain the liquor, and add sugar so as to make a syrup."

SYRUPUS AMOMI ZINGIBERIS, Edin. *Syrup of Ginger.*

"Take of ginger root, powdered, *six drachms;* boiling water, *one pound;* refined sugar, *twenty-two ounces.* Macerate the root in the water, in a covered vessel, for twenty-four hours: then add the sugar to the strained infusion, and dissolve by a gentle heat."

Syn. Sirop de Gingembre (*F.*), Sciroppo d'Amomo Zenzero (*I.*).

This syrup is moderately stimulant and carminative; and is an useful adjunct to bitter and tonic infusions.

Officinal preparations. — *Electuarium Catechu,* D. *Electuarium Opiatum,* D.

TINCTURÆ.

TINCTURES.[1]

THE term tincture is usually, although improperly, applied to spirituous solutions of such of the proximate principles of vegetables and animals as are soluble in pure alcohol or in proof spirit. From vegetable matter submitted to its action, alcohol takes up *sugar, resin, extractive, tannin, cinchonia, quina, piperina salicina, camphor, guaiacum, volatile oils, several acids, veratria, strychnia, aconitina, scillitina, elatin, morphia,* and *narcotina;* proof spirit also takes up the whole of these partially, and is, besides, the proper menstruum for gum resins; so that alcohol, either in a concentrated or diluted form, is capable of separating the greater part of the active

[1] Arnold de Villa Nova, who was professor of medicine at Montpellier, invented tinctures about the end of the 13th century. The term is a bad one, as, strictly speaking, it means a solution prepared for dyeing. Spirituous solutions would be more appropriate.

principles of vegetables from the ligneous inert fibres. The tinctures obtained from animal substances are very few in number, and the principles taken up by the spirit are analogous to those enumerated above, belonging to the vegetable kingdom. Pure alcohol is required in a very few instances only for the formation of tinctures, proof spirit being adequate for almost every purpose. The dilution of the spirit, however, must be varied according to the known principles of the substance to be submitted to its action: when resin predominates, it must necessarily be more concentrated; when gum-resin or extractive is the most abundant constituent, proof spirit then must be employed. In consequence of the great affinity of water for alcohol, the addition of it to alcoholic tinctures separates the resin, camphor, and volatile oils they contain; but water is generally miscible with tinctures made with proof spirit, without producing any decomposition. Tinctures are not liable to suffer spontaneous decomposition, as is the case with infusions and decoctions; and, independent of the loss which takes place from the evaporation of the spirit and the volatile oils, if the bottles containing tinctures be closely corked, they may be kept for an indefinite length of time, and their virtues remain unimpaired.

Tinctures are prepared by macerating the ingredients in the spirit in a temperature not exceeding 80°, at which degree, by allowing the menstruum to remain on the ingredients for a sufficient length of time, all the principles that can prove useful in the tincture are extracted, and the solvent saturated. The ingredients must be dried, and reduced to a coarse powder, and the maceration made in close vessels, and assisted by frequent agitation. When completely made, tinctures should not be allowed to remain upon the ingredients, but be filtered through bibulous paper, and kept in this state in well-corked bottles. Parmentier[1] has proposed that one half only of the spirituous menstruum be added to the ingredients at first; and, after digesting for six days, this part is to be poured off, and the remainder added. In six more the whole is to be strongly expressed, and the two portions of tincture mixed together. By this method he imagines more of the active principles of the ingredients are extracted, and the tinctures obtained of a more uniform strength.

Tinctures are not of very extensive use as remedies, except in cases where stimulants are indicated; the solvent, even in doses of a few fluid drachms, often acting more powerfully on the living system than the principles it holds in solution. In ordinary cases, this action, when continued for some time,

[1] *Annales de Chimie*, lxii. 40.

produces the same deleterious effects as the habitual use of ardent spirits; and often lays the foundation of the pernicious custom of dram drinking. When the action of a substance is the reverse of stimulant, it cannot with propriety be exhibited in this form, unless the dose be so small that the operation of the spirit cannot be taken into account, as in tincture of foxglove. The chief use of this class of preparations, therefore, is to enable infusions and decoctions, to which they are added, to sit lighter on the stomach, or to add to them some active principle which water is incapable of extracting.

The general rule given in the London Pharmacopœia for the preparation of tinctures is "to prepare them in closed vessels, and to shake them frequently during the maceration."

TINCTURA ALOES, Lond. *Tincture of Aloes.*

"Take of aloes, powdered, *an ounce;* extract of liquorice, *three ounces;* water, *a pint and a half;* rectified spirit, *half a pint.* Macerate for fourteen days, then strain."

Dublin.

"Take of socotorine aloes in powder, *half an ounce;* extract of liquorice, dissolved in eight ounces of boiling water, *an ounce and a half;* proof spirit, *eight fluid ounces.* Digest for seven days; then strain."

TINCTURA ALOES SOCOTORINÆ, Edin. *Tincture of Socotorine Aloes.*

"Take of socotorine aloes in powder, *half an ounce;* extract of liquorice, *one ounce and a half;* alcohol, *four ounces;* water, *a pound.* Digest for seven days, with a gentle heat, in a close vessel, which is to be frequently shaken (a circumstance to be attended to in preparing all the tinctures); then pour off the clear tincture."

Syn. Teinture d'Aloes (*F.*), Tinctura d'Aloe (*I.*).

This may be regarded rather as an aqueous solution than a tincture, the quantity of spirit being too small to serve any other purpose than that of preventing decomposition. It may be used in the same cases as the extract of aloes; but notwithstanding the presence of the liquorice, the bitterness of the aloes is so intense and disagreeable, as to prevent it from being often prescribed. Its dose is from f ℥ ss. to f ℥ jss.

TINCTURA ALOES ÆTHEREA, Edin. *Æthereal Tincture of Aloes.*

"Take of socotorine aloes, myrrh, of each, in powder, *an ounce and a half;* English saffron, cut, *an ounce;* sulphuric æther with alcohol, *a pound.* Digest the myrrh with the æther for four days in a closed bottle; then add the saffron and the aloes. Digest again for four days, and when the dregs have subsided pour off the tincture."

The spirit of sulphuric æther is supposed to afford a more grateful tincture than spirit of wine; and in cases attended with spasm, as in hysteria connected with obstructed menstruation, this solvent may prove serviceable, independent of the matter it holds in solution. It is a warm, stomachic purgative, and is advantageously given in dyspeptic affections, jaundice, gout, chlorosis, and other cases in which aloetics are indicated. In doses of f ʒ j. or f ʒ ij. it acts chiefly as a stomachic; but purges briskly in large doses.

TINCTURA ALOES COMPOSITA, Lond. *Compound Tincture of Aloes.*[1]

"Take of aloes, powdered, *four ounces;* saffron, *two ounces;* tincture of myrrh, *two pints.* Macerate for fourteen days, and strain."

Dublin.

"Take of tincture of myrrh, *two pints;* socotorine aloes, in powder, *three ounces.* Macerate for fourteen days, then strain."

TINCTURA ALOES ET MYRRHÆ, Edin. *Tincture of Aloes and of Myrrh.*

"Take of myrrh, in powder, *two ounces;* alcohol, *a pound and a half;* water, *half a pound.* Mix the alcohol with the water; then add the myrrh. Digest for four days; and, lastly, add of socotorine aloes in powder, *one ounce and a half;* English saffron, cut in pieces, *one ounce.* Digest again for three days, and pour off the clear tincture."

Syn. Alcohol avec l'Aloë et la Myrrhe (*F.*), Alcoole Aloë Mirrato (*I.*).

This tincture, which differs in little, except the solvent, from the former, may be used in the same cases. It resembles the *elixir proprietatis* of Paracelsus, and the old pharmacopœias. It is occasionally used as a local stimulant to foul ulcers. The dose is from f ʒ j. to f ʒ ij.

TINCTURA AMMONIÆ COMPOSITA, Lond. *Compound Tincture of Ammonia.*

"Take of mastick, *two ounces;* rectified spirit, *nine fluid ounces;* oil of lavender, *fourteen minims;* oil of amber, *four minims;* strong solution of ammonia, *a pint.* Macerate the mastick in the spirit, that it may be dissolved, and decant the clear tincture; then add the other articles, and shake all together."

In the accredited translation of the Pharmacopœia by Mr. Phillips, the quantity of mastick ordered is two drachms, a quantity more likely to be taken up by the spirit than that ordered by the College in the Latin edition of its work. The preparation is nearly the same as the spiritus ammoniæ succinatus of the last Pharmacopœia; and is intended to

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[1] Elixir Proprietatis, P. L. 1720.

resemble the *Eau de Luce*, which, however, contains no oil of amber.

Medical properties and uses. — This tincture is stimulant and antispasmodic: but it is seldom used; and in fact as it contains so little oil of amber, it possesses no advantages over the aromatic spirit of ammonia. The Eau de Luce is regarded almost as a specific for the bite of the Cobra de Capella. The dose is from ♏ v. to ♏ xx., in a glassful of water.

TINCTURA ASSAFŒTIDÆ, Lond. *Tincture of Assafœtida.*

"Take of assafœtida, *five ounces;* rectified spirit, *two pints.* Macerate for fourteen days, and strain."

Dublin.

"Take of assafœtida, *four ounces;* rectified spirit of wine, *two pints;* water, *eight fluid ounces.* Add the spirit to the assafœtida previously triturated with water; then digest for fourteen days, and strain."

TINCTURA FERULÆ ASSAFŒTIDÆ, Edin. *Tincture of Assafœtida.*

"Take of assafœtida, *four ounces;* alcohol, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Teinture d'Assafœtide (*F.*), Ascande tinkture (*G.*), Alcoole asfetidato (*I.*).

When this tincture is added to water or aqueous infusions, it renders them of a milky hue, but it is long before the separation of the oleo-resin takes place. It is given in the same cases as crude assafœtida, in doses of f ℥ j. or more.

Officinal preparation. — *Enema fœtidum,* D.

TINCTURA AURANTII, Lond. *Tincture of Orange-peel.*

"Take of fresh orange-peel, *three ounces and a half;* proof spirit, *two pints.* Macerate for fourteen days (three days, *Dub.*); and filter."

Syn. Pomeranzan schalen tinktur. (*G.*).

This tincture is not decomposed by water, and may therefore be added to infusions and decoctions, to which it is a useful adjunct in dyspepsia.

Officinal preparation. — *Mistura Ferri aromatica,* D.

TINCTURA BALSAMI TOLUTANI, Lond. *Tincture of Balsam of Tolu.*

"Take of balsam of tolu, *two ounces;* rectified spirit, *two pints.* Macerate until the balsam is dissolved, and strain."

TINCTURA TOLUIFERÆ BALSAMI, Edin. *Tincture of Balsam of Tolu.*

"Take of balsam of tolu, *an ounce and a half;* alcohol, *a pound.* Digest until the balsam is dissolved, and filter through paper."

TINCTURA BALSAMI TOLUTANI, Dub. *Tincture of Balsam of Tolu.*

"Take of balsam of tolu, *one ounce;* rectified spirit, *a pint.* Digest in a close vessel until the resin (balsam) is dissolved, then filter."

Tincture of balsam of tolu is scarcely ever used except on account of its agreeable flavour. As it is decomposed by water, it is necessary to triturate it with mucilage, to enable it to mix it with any aqueous fluid. It is chiefly used for making the syrup.

Officinal preparation. — *Syrupus Toluiferæ Balsami,* E.

TINCTURA BENZOINI COMPOSITA, Lond. TINCTURA BENZOES COMPOSITA, Dub. *Compound Tincture of Benzoin.*

"Take of benzoin, *three ounces and a half;* storax balsam, strained, *two ounces and a half;* balsam of tolu, *ten drachms;* aloes, *five drachms;* rectified spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

Syn. Teinture de Benzoin composée (*F.*), Zusammengesitzte Benzoe tinktur (*G.*).

TINCTURA BENZOINI COMPOSITA, Edin. *Compound Tincture of Benzoin.*

"Take of benzoin in powder, *three ounces;* balsam of Peru, *two ounces;* hepatic aloes in powder, *half an ounce;* alcohol, *two pounds.* Digest for seven days, and filter through paper."

Syn. Teintura del Commendatore; Alcoole Benzoato composito (*I.*).

This tincture is a stimulating expectorant, and as such is sometimes prescribed in chronic bronchitis and old asthmatic cases; but it is chiefly employed as an external application to wounds and languid ulcers, which it gently stimulates, and shields from the action of the air.[1] It is decomposed by water, and therefore, when given internally, must be triturated with yolk of egg or with mucilage, to suspend it in aqueous fluids. Its dose is from f ʒ ss. to f ʒ ij. or more.

TINCTURA BONPLANDIÆ TRIFOLIATÆ, Edin. *Tincture of Bonplandia, or Angustura.*

"Take of the bark of trifoliate Bonplandia, bruised, *two ounces;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

TINCTURA ANGUSTURÆ, Dub. *Tincture of Angustura.*

"Take of angustura bark in coarse powder, *two ounces;* proof spirit, *two pints.* Digest for seven days; then filter."

Syn. Teinture d'Angusture (*F.*).

This tincture, which contains the active principles of the

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[1] It is an improved form of Wade's balsam, or Friar's balsam.

cusparia bark, is given in doses of f ʒ j. or f ʒ ij. in the same cases as the bark. (See *Cusparia*, Part ii.)

TINCTURA BUCHU, Dub. *Tincture of Buchu.*

"Take of buchu leaves, *two ounces;* proof spirit, *one pint.* Macerate for seven days, and filter."

The spirit takes up little more than the volatile oil. The tincture possesses the diuretic properties of the leaves of the buchu. The dose is from f ʒ j. to f ʒ iv. in water, or the infusion of the buchu leaves.

TINCTURA CALUMBÆ, Lond. *Tincture of Calumba.*

"Take of calumba root, sliced, *three ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

TINCTURA COLOMBÆ, Edin. TINCTURA COLOMBO, Dub. *Tincture of Calumba.*

"Take of calumba root in powder, *two ounces;* proof spirit, *two pounds.* Digest for seven days, and filter through paper."

Proof spirit is the proper menstruum of calumba. The tincture is a useful addition to stomachic infusions and decoctions. It contains *colombina*, the active principle of the root.

TINCTURA CAMPHORÆ, Lond. Edin. *Tincture of Camphor.*

"Take of camphor, *five ounces;* rectified spirit, *two pints.* Dissolve the camphor."

This is the spiritus camphoræ of the last Pharmacopœia. As it is decomposed by water it can only be used as an external stimulant. It is a bad form of using camphor for any purpose.

TINCTURA CAMPHORÆ COMPOSITA[1], Lond. *Compound Tincture of Camphor.*

"Take of camphor, *two scruples and a half;* hard opium, powdered, acid of benzoin, of each *seventy-two grains;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

TINCTURA OPII CAMPHORATA, sive ELIXIR PAREGORICUM ANGLORUM, Edin. Dub. *Camphorated Tincture of Opium*, or *Paregoric Elixir.*

"Take of camphor, *two scruples;* hard purified opium in powder, benzoic acid, of each *a drachm;* proof spirit, *two pints.* Digest for seven (ten, *Dub.*) days, then filter."

Syn. Teinture camphrée d'Opium (*F.*), Opiumstinktur mit Benzoe (*G.*).

Half a fluid ounce of this tincture contains nearly a grain of opium. The tincture differs little from that which has been long known under the titles *Paregoric Elixir* and *Asthmatic Elixir.* It is a useful anodyne in chronic asthma,

[1] The change of name here imposed appears to us to be more likely to produce errors than the old name; and it is directly opposed to the principles of nomenclature adopted by the College.

hooping-cough, and chronic bronchitis, after the inflammatory symptoms have abated; in which it contributes to allay the tickling which induces the frequent cough. The dose is from f ʒ j. to f ʒ ij. occasionally in the above cases, using after it the inhaler; and f ʒ iij. in cases where quiet, rather than sleep, is required.

TINCTURA CANTHARIDIS, Lond. *Tincture of Blistering Fly.*

"Take of blistering flies, bruised, *four drachms;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

TINCTURA CANTHARIDIS VESICATORIÆ, Edin. *Tincture of Blistering Fly.*

"Take of blistering flies, bruised, *a drachm;* proof spirit, *a pound.* Digest for seven days, and filter through paper."

TINCTURA CANTHARIDIS, Dub. *Tincture of Blistering Fly.*

"Take of blistering flies in powder, *two drachms;* proof spirit, *a pound and a half.* Digest for seven days, then strain."

Syn. Teinture de Cantharides (*F.*), Cantharidentinktur (*G.*), Tintura di Cantaridi (*I.*).

Proof spirit extracts the active matter of blistering flies, and is a more convenient form for exhibiting it internally than in substance.

This tincture is useful in gleets, fluor albus, incontinence of urine, and in some cutaneous eruptions. The dose is from ♏ x. to f ʒ j. given in some demulcent infusion. As an external application it is efficaciously employed in conjunction with *soap* or *camphor liniment,* as an embrocation against rheumatic pains; and I have found that a rag moistened with it is a useful application in spontaneous mortification of the extremities; and to frost-bitten parts.

TINCTURA CAPSICI, Lond. Dub. *Tincture of Capsicum.*

"Take of capsicum, *ten drachms;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

This is a convenient form for exhibiting capsicum in tympanitis, cynanche maligna, the low stage of typhus; and in gargles. The dose is ♏ xij. to f ʒ ss. A mixture of f ʒ ij. with half a pint of water answers instead of the capsicum gargle.

TINCTURA CARDAMOMI, Lond. Dub. *Tincture of Cardamoms.*

"Take of cardamoms, bruised, *three ounces and a half;* proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

TINCTURA AMOMI REPENTIS, Edin. *Tincture of Cardamoms.*

"Take of lesser cardamom seeds, bruised, *four ounces;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

TINCTURA CARDAMOMI COMPOSITA, Lond. Dub. *Compound Tincture of Cardamoms.*

"Take of cardamoms, carraway seeds, of each, in powder, *two drachms and a half;* cochineal, powdered, *a drachm;* cinnamon, bruised, *five drachms;* raisins, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

The raisins and the cochineal are properly omitted in the Dublin formula. Both the simple and the compound tinctures of cardamoms are agreeable cordials, and form elegant adjuncts to stomachic infusions.

TINCTURA CASCARILLÆ, Lond. Dub. *Tincture of Cascarilla.*

"Take of cascarilla, powdered, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

TINCTURA CROTONIS ELEUTHERIÆ, Edin. *Tincture of Croton Eleutheria,* or *Cascarilla.*

"Take of croton eleutheria, bruised, *four ounces;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Cascarillentinktur (*G.*).

This tincture may be regarded as superfluous, as it is scarcely ever ordered.

TINCTURA CASTOREI, Lond. TINCTURA CASTOREI ROSSICI, Dub. *Tincture of Castor.*

"Take of castor, powdered, *two ounces and a half* (℥ ij *Dub.*); rectified spirit (proof spirit, *Dub.*), *two pints.* Macerate for fourteen days, and filter."

Edinburgh.

"Take of castor, powdered, *an ounce and a half;* alcohol, *a pound.* Macerate for seven days, and filter through paper."

Syn. Teinture de Castor (*F.*), Castoreumstinktur (*G.*), Tintura di Castoro (*I.*).

Rectified spirit is the preferable solvent of castor, which contains resin and a volatile oil; and it also affords a more grateful tincture than that made with proof spirit. The tincture is supposed to possess any medical properties which the castor possesses. The dose is from ♏ xx. to f. ʒ ij.

The Dublin College orders a "*Tincture of Russian Castor,*" and a "*Tincture of Canadian Castor,*" which is an unnecessary refinement. A few drops of the tincture of castor, dropped into distilled water, produces a milky mixture, which is again cleared and decolorized by the addition of ammonia.

TINCTURA CASTOREI COMPOSITA, Edin. *Compound Tincture of Castor.*

"Take of Russian castor, powdered, *an ounce;* assafœtida, *half an ounce;* ammoniated alcohol, *one pound.* Digest for seven days, and filter through paper."

This is a more active preparation than the former, and is advantageously given in hysteria, cramp of the stomach, and flatulent colic, to the extent of f ʒ ij. for a dose.

TINCTURA CATECHU[1], Lond. Dub. *Tincture of Catechu.*

"Take of catechu, *three ounces and a half;* cinnamon, bruised, *two ounces and a half;* proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

TINCTURA CATECHU ACACIÆ, Edin. *Tincture of Catechu.*

"Take of extract of catechu in powder, *three ounces;* cinnamon bark, bruised, *two ounces;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Teinture de Cachou (*F.*), Katechutinktur (*G.*).

Proof spirit dissolves all the soluble parts of catechu, except the mucilage, which in ℥ iij. ss. of Bengal catechu amounts to 110 grains; besides which 84 grains of impurities remain undissolved. The tincture is a solution of tannin, extractive, and the volatile oil of cinnamon. It is a grateful, warm astringent, useful in all cases in which astringents are indicated. The dose is from f ʒ j. to f ʒ iij.

TINCTURÆ CINCHONÆ[2], Lond. *Tincture of Cinchona.*

"Take of heart-leaved cinchona bark, in powder, *eight ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

TINCTURA CINCHONÆ LANCIFOLIÆ, Edin. TINCTURA CINCHONÆ, Dub. *Tincture of lance-leaved Cinchona.*

"Take of cinchona bark in powder, *four ounces;* proof spirit, *two pounds and a half* (*two pints*, Dub.) Digest for seven days, and filter through paper."

Syn. Teinture de Quinquina (*F.*), Chinatinktur (*G.*), Tintura di China (*I.*).

Although this tincture contains the active principles of cinchona bark in considerable quantity, yet from the nature of the vehicle it cannot be given in sufficiently large doses to produce the beneficial effects of the bark in substance; it is therefore used chiefly as an adjunct to the infusion or decoction. The dose is from f ʒ j. to f ʒ iv.

TINCTURÆ CINCHONÆ AMMONIATA, Edin. *Ammoniated Tincture of Bark.*

"Take of lance-leaved cinchona bark, powdered, *four*

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[1] Tinctura Japonica, P. L. 1745.

[2] Tinctura corticis Peruvianæ simplex, P. L. 1745.

ounces; aromatic spirit of ammonia, *two pints.* Macerate for ten days, and filter."

This is the formula of 1787, which was rejected in 1809. It is said to be useful in dyspeptic complaints attended with much acidity; but little of its utility is due to the cinchona bark.

TINCTURA CINCHONÆ COMPOSITA, Lond. Edin. Dub. *Compound Tincture of Cinchona.*

"Take of lance-leaved cinchona, powdered, *four ounces;* orange-peel, *three ounces* (*half an ounce,* Dub.); Virginian snake-root, bruised, *six drachms;* saffron, *two drachms;* cochineal, in powder, *a drachm;* proof spirit, *two pints.* Macerate for fourteen (seven, *Edin.*) days, and filter."

Syn. Zusammengesetzte Chinatinktur (*G.*).

This tincture is more grateful than the former; and although it contains less cinchona, yet the addition of the other ingredients renders it more useful both as a stomachic and a tonic. It is the same as the celebrated *Tincture of Huxham*[1], who generally gave it in intermittents, and low nervous fevers, in diluted wine or any proper vehicle, with ten or fifteen drops of elixir of vitriol (aromatic sulphuric acid, *Edin.*). The dose is from f ʒj. to f ʒiij. or more.

TINCTURA CINNAMOMI, Lond. Dub.[2] TINCTURA LAURI CINNAMOMI, Edin. *Tincture of Cinnamon.*

"Take of cinnamon, bruised, *three ounces and a half* (*three ounces and a half,* Dub.); proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

Syn. Teinture de Canelle (*F.*), Zimmttinktur (*G.*), Tintura di Cinnamomo (*I.*).

This tincture contains the active principles of the bark, and is an elegant and useful adjunct to astringent infusions. It is incompatible in prescriptions with the strong mineral acids, lime-water, sulphates of iron, nitrate of silver, acetate and diacetate of lead. The dose is from f ʒj. to f ʒij.

TINCTURA CINNAMOMI COMPOSITA[3], Lond. *Compound Tincture of Cinnamon.*

"Take of cinnamon, bruised, *six drachms;* cardamoms, bruised, *three drachms;* long pepper, powdered, ginger, sliced, of each *two drachms;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

TINCTURA CINNAMOMI COMPOSITA, Edin. *Compound Tincture of Cinnamon.*

"Take of cinnamon bark, bruised, lesser cardamom seeds, bruised, of each *one ounce;* long pepper in powder, *two*

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[1] *Essay on Fever,* 122. [2] Aqua cinnamomi forts, P. L. 1720.
[3] Tinctura aromatica, P. L. 1745.

drachms; proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Teinture de Saffron (*F.*).

This is a much warmer aromatic than the simple tincture; and is frequently advantageously used in flatulencies, atonic gout, languors, and debility, in doses of f ʒ j. or f ʒ ij., properly diluted.

Officinal preparation.—*Æther sulphuricus cum Alcohole aromaticus,* E.

TINCTURA COLCHICI, Lond. Dub. *Tincture of Colchicum.*

"Take of the seeds of colchicum autumnalis, *five ounces;* (*two ounces,* Dub.); proof spirit, *two pints* (*a pint,* Dub.). Macerate for fourteen days; then strain."

This is a useful form of administering colchicum of a determinate strength. The dose is from ♏ xij. to f ʒ ij.

TINCTURA COLCHICI COMPOSITA, Lond. *Compound Tincture of Colchicum.*

"Take of colchicum seeds, bruised, *five ounces;* aromatic spirit of ammonia, *two pints.* Macerate for fourteen days, and filter."

This is the ammoniated spirit of colchicum of the last Pharmacopœia; it is less active than the tincture. The dose is from f ʒ ss. to f ʒ j.

TINCTURA CONII, Lond.

"Take of dried leaves of conium, *five ounces;* cardamoms, bruised, *an ounce;* proof spirit, *two pints.* Digest for fourteen days, and filter."

TINCTURA CONII MACULATI, Edin. Dub. *Tincture of Hemlock.*

"Take of dried leaves of hemlock, *two ounces;* cardamom seeds, bruised, *half an ounce;* proof spirit, *sixteen ounces.* Digest for seven days, and filter through paper."

This is an elegant form of administering conium; and admits of its being added to mixtures. It possesses all the active properties of the plant.

TINCTURA CROCI SATIVI, Edin. *Tincture of Saffron.*

"Take of English saffron, cut in shreds, *one ounce;* proof spirit, *fifteen ounces.* Digest for seven days, and filter through paper."

This tincture contains volatile oil, extractive, and *polychroite,* the colouring matter of the saffron. It is stimulant and diaphoretic, but its chief value perhaps arises from its colour.

TINCTURA CUBEBÆ, Lond. *Tincture of Cubebs.*

"Take of cubebs, bruised, *five ounces;* rectified spirit, *two pints.* Macerate for fourteen days, and strain."

TINCTURA PIPERIS CUBEBÆ, Dub. *Tincture of the Cubeb.*

"Take of cubebs, *four ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

If the object in this preparation is to separate the active principle of the cubebs, so as to concentrate its power, the proportion of the cubebs is too small, half an ounce of the tincture being equal only to a moderate dose, namely, half a drachm of the powder. The dose should be at least f ʒij.

TINCTURA DIGITALIS, Lond. *Tincture of Foxglove.*

"Take of foxglove leaves, dried, *four ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

Syn. Teinture de Digitale (*F.*), Fingerhautinktur (*G.*), Tintura di Digitale porporrina (*I.*).

Dublin.

"Take of foxglove leaves (the larger ones being rejected), dried and reduced to coarse powder, *two ounces;* proof spirit, *a pint.* Digest for seven days, and filter."

TINCTURA DIGITALIS PURPURÆ, Edin. *Tincture of Foxglove.*

"Take of foxglove leaves, dried, *one ounce;* proof spirit, *eight ounces.* Digest for seven days, and filter through paper."

This is the best and most convenient form for exhibiting foxglove. When the leaves are recently dried, the tincture contains digitalia, the alkaloid principle on which the virtues of the plant depend, and has the advantage of preserving these virtues unimpaired for any length of time. The dose should be ♏x. at first, and gradually increased, the same cautions being necessary as in the exhibition of the plant in substance.

TINCTURA GALBANI, Dub. *Tincture of Galbanum.*

"Take of galbanum, cut into small pieces, *two ounces;* proof spirits, *two pints.* Digest for seven days, then filter."

It is used in the same cases as tincture of assafœtida; but, if less nauseous, it is also less powerful.

TINCTURA GALLÆ, Lond. TINCTURA GALLARUM, Edin. Dub. *Tincture of Galls.*

"Take of galls in powder, *five ounces* (*two ounces,* Edin. *four ounces,* Dub.); proof spirit, *two pints* (*sixteen ounces,* Edin. *two pints,* Dub.). Macerate for fourteen days, then filter."

Proof spirit dissolves both tannin and gallic acid; consequently this tincture contains all the astringency of the galls. It is fully as useful as Ruspini's styptic, which is a solution of gallic acid in weak spirit, with minute quantities of sulphate of zinc and extract of opium. The dose of this tincture is from ♏xx. to f ʒij.

TINCTURA GENTIANÆ COMPOSITA[1], Lond. Dub. *Compound Tincture of Gentian.*

"Take of gentian root, sliced, *two ounces and a half;* orange-peel, dried, *ten drachms;* cardamoms, bruised, *five drachms;* proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

TINCTURA GENTIANÆ COMPOSITA, Edin. *Compound Tincture of Gentian,* commonly called *Stomachic Tincture.*

"Take of yellow gentian root, sliced and bruised, *two ounces;* orange-peel, dried and bruised, *one ounce;* canella alba, bruised, *half an ounce;* cochineal in powder, *half a drachm;* proof spirit, *two pints and a half.* Digest for seven days, and filter through paper."

Syn. Teinture de Gentiane composée (*F.*), Enziantinktur (*G.*), Tintura di Genziana (*I.*).

This is an elegant stomachic bitter and cordial; but in dyspepsia, in which it is more particularly indicated, the infusion is preferable.

TINCTURA GUAIACI, Lond. Dub. *Tincture of Guaiacum.*

"Take of guaiacum resin, powdered, *seven ounces* (*four ounces,* Dub.); proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

TINCTURA GUAIACI OFFICINALIS, Edin. *Tincture of Guaiacum.*

"Take of guaiacum, in powder, *six ounces;* alcohol, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Teinture de Guajac (*F.*), Guaiaktinktur (*G.*), Tintura di Guajac (*I.*).

The difference in the proportion of the guaiacum in these formulæ is to be regretted. It is separated from the alcohol by the addition of water; and, therefore, when this tincture is to be given in the form of draught it must be triturated with yolk of egg, or with mucilage, to enable it to combine with water. The dose is from f ʒj. to f ʒiv., in any convenient vehicle.

TINCTURA GUAIACI COMPOSITA[2], Lond. TINCTURA GUAIACI AMMONIATA, Dub. Edin. *Compound Tincture of Guaiacum.*

"Take of guaiacum resin in powder, *seven ounces;* aromatic spirit of ammonia, *two pints.* Macerate for fourteen days (seven days, *Edin. Dub.*), and filter."

Syn. Teinture Ammoniacal de Guajac (*F.*), Ammonium guajaktinktur (*G.*), Alcoole Ammoniato con Guajaco; Tintura Guajachina volatile (*I.*).

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[1] Tinctura amara, P. L. 1745.

[2] Tinc. guaiacina volatilis, P. L. 1745. Tinct. Guaiaci ammoniata, P. L. 1824.

As the ammonia coincides with the operation of guaiacum more than spirit, this tincture is more efficacious as a stimulating sudorific than the former preparation. Water decomposes it, separating the guaiacum in dark curdy flakes. Chlorine, nitrous acid, and the spirit of nitric æther separate the guaiacum into curdy, coagulated masses, and impart to the whole an intense blue colour: but sulphuric and hydrochloric acids produce no change. Dr. Paris says, "if equal parts of quicklime and powder of guaiacum be rubbed together, and a quantity of water be poured over them, and the mixture allowed to stand until it become fine, we shall obtain a solution of this substance, which will mix in any proportion with aqueous vehicles without decomposition, and to which the aromatic spirit of ammonia may be subsequently added with effect." The dose is from f ʒ j. to f ʒ ij., triturated with any mucous or viscid matter.

TINCTURA HELLEBORI[1], Lond. *Tincture of Hellebore.*

"Take of the root of (black) hellebore, sliced, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

Edinburgh. Dublin.

"Take of black hellebore root, bruised (powdered, *Dub.*), *two ounces;* cochineal in powder, *fifteen grains* (*two scruples,* Dub.); proof spirit, *fifteen ounces* (*two pints,* Dub.). Digest for seven days, then filter through paper."

Syn. Teinture d'Ellebore noir (*F.*), Tintura d'Elleboro (*I.*).

The smallness of the fibres of the root of black hellebore, which are the parts medicinally employed, renders it almost impossible to follow the direction of the London formula; and it is better to powder it coarsely, as ordered by the Dublin College. This tincture was regarded by Dr. Mead as a powerful emmenagogue, and is still ordered in uterine obstructions, and in some cutaneous affections. The dose is from ♏ xxx. to f ʒ j. in any appropriate vehicle.

TINCTURA HYOSCYAMI, Lond. *Tincture of Henbane.*

"Take of the dried leaves of henbane, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

Dublin.

"Take of the dried leaves of black henbane in coarse powder, *five ounces;* proof spirit, *two pints.* Digest for seven days; then strain."

TINCTURA HYOSCYAMI NIGRI, Edin. *Tincture of Black Henbane.*

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[1] Tinctura melampodii, P. L. 1745. Tinct. Hellebori nigri, P. L. 1824.

"Take of the dried leaves of black henbane, *an ounce;* proof spirit, *eight ounces.* Digest for seven days, and filter through paper."

This is a much more useful substitute for tincture of opium than the tincture of hops. In a dose of f ʒ j. to ʒ ij. it seldom fails of procuring sleep and quiet; and does not affect the head or produce costiveness.

TINCTURA JALAPÆ, Lond.[1] *Tincture of Jalap.*

"Take of jalap, powdered, *ten ounces;* proof spirit, *two pints.* Digest for fourteen days, then filter."

Dublin.

"Take of jalap root in coarse powder, *eight ounces;* proof spirit, *two pints.* Digest for fourteen days, then filter."

TINCTURA CONVOLVULI JALAPÆ, Edin. *Tincture of Jalap.*

"Take of jalap root in powder, *three ounces;* proof spirit, *fifteen ounces.* Digest for seven days, and filter through paper."

Proof spirit extracts the active principles of jalap, namely, the gum, extractive, and resin, all of which are requisite for the production of its full cathartic effect. The great difference in point of strength of these tinctures is much to be regretted. Dose f ʒ j. to f ʒ iij.

TINCTURA IODINII COMPOSITA, Lond. *Compound Tincture of Iodine.*

"Take of iodine, *an ounce;* iodide of potassium, *two ounces;* rectified spirit, *two pints.* Macerate until they are dissolved, and filter."

TINCTURA IODINII, Dub. *Tincture of Iodine.*

"Take of iodine, *two scruples;* rectified spirit, *one ounce.* Mix and dissolve the iodine by the aid of heat. Keep the mixture in a closely-stopped phial."

This is a saturated spirituous solution of iodine, with the addition of the iodide of potassium in the London preparation, which adds nothing to its power. It is a convenient mode of administering iodine. The dose is from ten minims, gradually increased to sixty twice or three times a day.

TINCTURA KINO, Lond. *Tincture of Kino.*

"Take of kino in powder, *three ounces and a half;* proof spirit, *two pints.* Macerate for fourteen days, and strain."

Edinburgh. Dublin.

"Take of kino *two ounces* (*three ounces*, Dub.); proof spirit, *a pint and a half.* Digest for seven days, and filter through paper."

Syn. Teinture de Kino (*F.*).

The matter in solution in this tincture is chiefly tannin.

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[1] Tinctura jalapæ, P. L. 1745, 1787.

It is administered in chronic diarrhœa, the latter stage of dysentery, fluor albus, and in all cases in which astringents are indicated; but it is less certain in its operation than the tincture of catechu. When the kino of the Eucalypta is used, the tincture becomes gelatinous when kept. The dose is from f ʒ j. to f ʒ ij.

TINCTURA LAVANDULÆ COMPOSITA, Lond. *Compound Tincture of Lavender.*[1]

"Take of spirit of lavender, *a pint and a half;* spirit of rosemary, *half a pint;* cinnamon bruised, nutmeg bruised, each *two drachms and a half;* red saunders wood, sliced, *five drachms.* Macerate for fourteen days, and filter. Stimulant in faintings. Dose ♏ xx. to f ʒ j.

TINCTURA LUPULI, Lond. TINCTURA HUMULI, Edin. Dub. *Tincture of Hops.*

"Take of hops, *six ounces;* proof spirit, *two pints* (*two pounds and a half,* Edin.). Macerate for fourteen days, and filter."

The bulk of the hops renders it difficult to make the quantity of spirit here ordered act equally on them, therefore their surface should be several times changed by stirring, during the maceration, and the tincture expressed as ordered by the Edinburgh College. The tincture is supposed to possess the tonic and narcotic properties of the plant, and may be regarded as an alcoholic solution of lupulin. It has been recommended in gout and rheumatism[2]; but, from the experiments of Dr. Bigsby, its efficacy is problematical.[3] The dose is from f ʒ ss. to f ʒ ij., or more.

TINCTURA MOSCHI. Dub. *Tincture of Musk.*

"Take of musk in powder, *two drachms;* rectified spirit, *a pint.* Digest for seven days, then strain."

Syn. Teinture de Musc (*F.*), Tintura di Muschio (*I.*).

The only effectual form in which musk can be exhibited is in powder; much larger doses of it being requisite to do any good than can be given in a spirituous vehicle.

TINCTURA MYRRHÆ, Lond.[4] *Tincture of Myrrh.*

"Take of myrrh, *three ounces;* rectified spirit, *two pints.* Macerate for fourteen days, and filter."

Edinburgh.

"Take of myrrh in powder, *three ounces;* alcohol, *twenty ounces;* water, *ten ounces.* Digest for seven days, and filter through paper."

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1 Spir. Lavandulæ comp. P. L. 1824.
2 *Freak's Observations on the Humulus Lupulus,* 9. *et passim.*
3 *London Medical Repository.*
4 Tinct. myrrhæ simplex, P. L. 1720.

Dublin.

"Take of myrrh, bruised, *three ounces;* proof spirit, *a pint and a half;* rectified spirit, *half a pint.* Digest for seven days, then strain."

Syn. Teinture de Myrrhe (*F.*), Myrrhentinktur (*G.*), Tintura de Mirra (*I.*).

A transparent tincture of a golden yellow colour may be prepared by treating myrrh with alcohol or rectified spirit alone, as ordered by the London College. This tincture is tonic and deobstruent; but it is more generally used in gargles, combined with infusion of roses and acids; or as an application to foul ulcers, and exfoliating bones; or, diluted with water, as a wash for the mouth, when the gums are spongy. The dose is from f ʒ ss. to f ʒ j.

TINCTURA NUCIS VOMICÆ, Dub. *Tincture of Nux Vomica.*

"Take of rasped nux vomica, *two ounces;* rectified spirit, *eight ounces.* Macerate for seven days; then filter."

This is a useful preparation, and may supersede the extract, being more certain in point of strength; but still it is less useful than the acetate of strychnia.

TINCTURA OPII, Lond. *Tincture of Opium.*

"Take of hard opium, powdered, *three ounces;* proof spirit, *two pints.* Macerate for fourteen days, and strain."

TINCTURA OPII, sive THEBAICA; vulgo, LAUDANUM LIQUIDUM, Edin. *Tincture of Opium,* or *Thebaic Tincture;* commonly called *Liquid Laudanum.*

"Take of opium, *two ounces;* proof spirit, *two pounds.* Macerate for seven days, and filter through paper."

TINCTURA OPII, Dub. *Tincture of Opium.*

"Take of purified hard opium in coarse powder, *ten drachms;* proof spirit, *a pint.* Digest for seven days; then strain."

Syn. Teinture d'Opium (*F.*), Opiums-tinktur (*G.*), Laudano liquido; Alcoole opiato (*I.*).

The strength of this tincture renders ℳ xix. equal to one grain of opium: the Dublin preparation is stronger, ℳ xiv. of it containing one grain of opium. Mr. Brande says the whole of the morphia is not taken up, for it is found in no inconsiderable quantity in the matter which remains on the filter. This tincture may be used in all cases in which opium is indicated, and is a very convenient and elegant form of giving the remedy.[1] The usual dose is from ℳ x. to ℳ lx.; but in some morbid states of the habit very large doses can be borne, and are even necessary. In colica pictonum f ʒ j. given before using purges facilitates their action, and renders the relief more

[1] It ought to be kept in opaque bottles; as light, according to the experiments of Vogel, has the power of decomposing it. Vide *Journ. de Pharm.* Mai, 1815. p. 199.

speedy: in tetanus, f ℥ vss. have been given in divided doses, with advantage, in twenty-six hours.[1] As an external application this tincture rubbed upon the skin produces its anodyne effects in a smaller degree, allays local pains, and assists in relaxing the spasm in lock-jaw and similar affections.

Its powers are very much increased by combining it with distilled vinegar; an acetate of morphia being thus produced: it is decomposed, and its morphia precipitated, by ammonia, potassa, soda, and their carbonates, most metallic salts, astringent vegetable infusions and decoctions.

TINCTURA OPII AMMONIATA; olim, ELIXIR PAREGORICUM, Edin. *Ammoniated Tincture of Opium; formerly Paregoric Elixir.*

"Take of opium, *two drachms;* benzoic acid, saffron, cut in shreds, of each *three drachms;* volatile oil of anise-seed, *half a drachm;* ammoniated alcohol, *sixteen ounces.* Digest for seven days, and filter through paper."

This tincture contains morphia only as long as it remains undiluted: little benefit, therefore, is derived from the opium; but it is useful in hooping-cough and spasmodic asthma. Each f ʒ j. contains gr. j. of opium.

TINCTURA QUASSIÆ EXCELSÆ, Edin. *Tincture of Quassia.*

"Take of quassia wood, rasped, *one ounce;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

TINCTURA QUASSIÆ, Dub. *Tincture of Quassia.*

"Take of chips of quassia wood, *an ounce;* proof spirit, *two pints.* Digest for seven days, then strain."

Syn. Teinture de Quassia (*F.*).

This tincture contains the bitter of the wood in perfection, and may be used in the same cases as the infusion.

TINCTURA RHEI[2], Dub. *Tincture of Rhubarb.*

"Take of rhubarb root, sliced, *two ounces;* lesser cardamon seeds, husked and bruised, liquorice, bruised, of each *half an ounce;* saffron, *two drachms;* proof spirit, *two pints.* Digest for seven days; then filter."

TINCTURA RHEI, Edin. *Tincture of Rhubarb.*

"Take of rhubarb root, sliced, *three ounces;* lesser cardamom seeds, bruised, *half an ounce;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Teinture de Rhubarbe (*F.*), Rhabarbertinktur (*G.*), Tinctura de Rhabarbaro (*I.*).

TINCTURA RHEI COMPOSITA[3], Lond. Dub. *Compound Tincture of Rhubarb.*

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1 *Currie's Report on Cold Water,* i. 138.
2 Tinctura rhabarbari, P. L. 1720. 1787.
3 Tinctura rhabarbari composita, P. L. 1787.

"Take of rhubarb root, sliced, *two ounces and a half;* liquorice, bruised, *six drachms;* ginger, sliced, saffron, of each *three drachms;* proof spirit, *two pints.* Macerate for fourteen days, and filter."

TINCTURA RHEI ET ALOES, Edin. *Tincture of Rhubarb and Aloes;* formerly, *Sacred Elixir.*

"Take of rhubarb root, sliced, *ten drachms;* socotorine aloes, powdered, *six drachms;* lesser cardamom seeds, bruised, *half an ounce;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

Syn. Alcohol avec Aloë et Rhubarbe (*F.*), Alcoole Aloe-Rabarbarato (*I.*).

TINCTURA RHEI ET GENTIANÆ, Edin. *Tincture of Rhubarb and Gentian.*

"Take of rhubarb root, sliced, *two ounces;* gentian root, sliced, *half an ounce;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

All these tinctures of rhubarb are purgative and stomachic; but the strength of the menstruum is too great to permit of their general use for the first intention, and they are more usually employed as adjuncts to saline purgatives, to give them warmth, or to stomachic infusions in dyspepsia, flatulent colic, diarrhœa, the costiveness of old people and of those of cold phlegmatic habits. The dose to operate as a purgative is f ʒ vj. and from fʒj. to fʒiij. to produce stomachic effects.

TINCTURA SCILLÆ, Lond. Edin. Dub. *Tincture of Squills.*

"Take of squill, fresh dried, *five ounces* (*two ounces,* Edin.); proof spirit, *two pints* (*sixteen ounces,* Edin.). Macerate for fourteen days, and filter." (Digest for seven days, then set it aside until the dregs are subsided, and pour off the clear liquor, *Dub.*)

Proof spirit takes up the active principles of the squill, and affords a convenient form of exhibiting it in all the cases in which it is indicated. The dose is from x. to ♏ xxx. given in almond mixture, ammoniacum mixture, or mucilage.

TINCTURA SENNÆ COMPOSITA[1], Lond. *Tincture of Senna.*

"Take of senna leaves, *three ounces and a half;* carraway, bruised, *three drachms and a half;* cardamoms, bruised, *a drachm;* raisins, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, and filter.

TINCTURA SENNÆ COMPOSITA, Dub. *Compound Tincture of Senna.*

"Take of senna leaves, *a pound;* carraway seeds, bruised, *one ounce and a half;* lesser cardamom seeds, husked and

[1] Elixir salutis, P. L. 1720. Tinct. Sennæ, P. L. 1824.

bruised, *half an ounce;* proof spirit, *a gallon.* Digest for fourteen days, then filter."

TINCTURA SENNÆ COMPOSITA, Edin. *Compound Tincture of Senna.*

"Take of the leaves of senna, *two ounces;* jalap root, bruised, *one ounce;* coriander seeds, bruised, *half an ounce;* proof spirit, *three pounds and a half.* Digest for seven days, and to the filtered tincture add of refined sugar, *four ounces.*"

These tinctures are stomachic and purgative. They are very efficacious in flatulent colic, atonic gout [1], and as an opening medicine for those whose bowels have been weakened by intemperance. The dose is from f ʒ ij. to f ℥ j. in any appropriate vehicle.

TINCTURA SERPENTARIÆ, Lond. Dub. *Tincture of Snake Root.*

"Take of snake root (cut and bruised, *Dub.*), *three ounces and a half;* proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter."

TINCTURA ARISTOLOCHIÆ SERPENTARIÆ, Edin. *Tincture of Snake Root.*

"Take of snake root, bruised, *two ounces;* cochineal, in powder, *a drachm;* proof spirit, *two pounds and a half.* Digest for seven days, and filter through paper."

This tincture is stimulant, diaphoretic; and an useful addition to infusion of cinchona bark, in typhoid and putrid fevers, gout, and periodic headach. The dose is from f ʒ ss. to ʒ ij.

TINCTURA VALERIANÆ, Lond. Dub. *Tincture of Valerian.*

"Take of valerian, bruised, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days (seven days, *Dub.*), and filter.

Syn. Teinture de Valeriane (*F.*), Baldriantinktur (*G.*), Tintura di Valeriana (*I.*).

Proof spirit extracts the active matter of the valerian, but the tincture cannot be given in doses sufficiently large to prove very efficacious.

TINCTURA VALERIANÆ COMPOSITA, Lond. *Compound Tincture of Valerian.*[2]

"Take of valerian root, bruised, *five ounces;* aromatic spirit of ammonia, *two pints.* Macerate for fourteen days, and filter."

Edinburgh. Dublin.

"Take of valerian root in powder, *two ounces* (*four ounces,*

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[1] The preparation called *Gout Cordial* is a mixture of tincture of senna and tincture of rhubarb.

[2] Tinctura valerianæ volatilis, P. L. 1745.

Edin.); spirit of ammonia, *a pint* (*two pounds and a half*, Edin.). Digest for seven days; then filter."

Syn. Baldriantinktur mit Ammonium liquor (*G.*).

As the ammonia corresponds in virtue with the valerian, this tincture is more powerful than the foregoing. It is advantageously employed in hysteria and other nervous affections, in doses of f ʒj. or ʒij., given in milk or some other bland fluid.

TINCTURA VERATRI ALBI, Edin. *Tincture of White Hellebore.*

"Take of white hellebore root, bruised, *eight ounces;* proof spirit, *one pound and a half.* Digest for seven days, and filter through paper."

This tincture is sometimes employed to excite vomiting in maniacal and apoplectic cases; and as an alterative in cutaneous eruptions. It owes its efficacy to an alkaloid, which has been named *Veratria*, the same principle to which colchicum owes its virtues. It is given in doses of v. to ♏ x.; but it is a very unmanageable remedy, producing sometimes the most violent effects.

TINCTURA ZINGIBERIS, Lond. Dub. TINCTURA AMOMI ZINGIBERIS, Edin. *Tincture of Ginger.*

"Take of ginger root, sliced, *two ounces and a half;* rectified spirit, *two pints.* Macerate for fourteen days (seven days, *Dub. Edin.*), and filter."

This tincture possesses all the pungency of the ginger, and is useful as a stimulant and carminative, in atonic gout, when it attacks the stomach, in flatulent colic, and as a corrigent to griping purgatives.

TABLE OF TINCTURES.

Tinctures prepared with Rectified Spirit of the Spec. Grav. 835.

Tinctura Aloes,	Tinctura Cubebæ comp.
——— Aloes comp.	——— Iodinii comp.
——— Aloes et Myrrhæ,	——— Kino,
——— Assafœtidæ,	——— Myrrhæ,
——— Benzoini comp.	——— Moschi,
——— Camphoræ,	——— Nucis Vomicæ,
——— Castorei,	——— Tolutani Balsami,
——— Ferri Sesquichloridi,	——— Zingiberis.
——— Guaiaci,	

Tinctures prepared with Proof Spirit of the Spec. Grav. 930.

Tinctura Aurantii,	Tinctura Capsici,
——— Bonplandiæ trifoliatæ,	——— Cardamomi,
——— Calumbæ,	——— Cardamomi comp.
——— Camphoræ comp.	——— Cascarillæ,
——— Cantharidis,	——— Catechu,

Tinctura Cinchonæ,
——— Cinchonæ comp.
——— Cinnamomi,
——— Cinnamomi comp.
——— Colchici,
——— Colchici comp.
——— Conii,
——— Croci sativi,
——— Digitalis,
——— Ferri Ammoniati,
——— Galbani,
——— Gallæ,
——— Gentianæ comp.
——— Hellebori,
——— Humuli,
——— Hyosciami,
Tinctura Jalapæ,
——— Kino,
——— Lupuli,
——— Opii,
——— Piperis Cubebæ,
——— Quassiæ excelsæ,
——— Rhei,
——— Rhei composita,
——— Rhei et Aloes,
——— Rhei et Gentianæ,
——— Scillæ,
——— Sennæ comp.
——— Serpentariæ,
——— Valerianæ,
——— Valerianæ comp.
——— Veratri albi.

VEGETABILIA.

VEGETABLES.

THE collection of vegetables cannot be attended to by the apothecary, and, consequently, the directions necessary for that purpose are of less importance to him than a knowledge of the botanical characters of plants, and the appearances they assume when they are collected under proper circumstances and well dried: for inert plants are often introduced by the collectors among those which possess the most active properties; and from a careless or an improper mode of drying plants, the medicinal virtues of the majority of them are altogether destroyed. When, however, opportunities permit the apothecary to be his own collector, they should not be neglected; and the collection and drying of some plants, particularly of foxglove and hemlock, should never be left to the common collector. The following general directions are therefore given in the London Pharmacopœia for collecting vegetable substances.

"VEGETABLES are to be gathered in dry weather, and when no dew nor rain is upon them: they are to be collected every year, and any which shall have been longer kept are to be thrown away." This is a direction of the utmost importance as far as regards the more active vegetable remedies, such as digitalis; for the skill of the most experienced physician will little avail the patient, if the drug which is ordered have lost its medicinal properties from being too long kept.

"ROOTS, for the most part, are to be dug up before their stems or leaves shoot forth." The object of this order is the obtaining the roots with their active principles in the most concentrated state, which may be effected by digging them up late in autumn, or early in winter, after the sap is completely detruded to the root, and the stem is withered, but yet attached to the root, by which its situation is pointed out. If any change in the composition of the juices takes place during the cessation of vegetation in winter, it is probable that the same will happen, if the root, after being dug up, be preserved in sand.

"BARKS are to be collected at that season in which they are more easily separated from the wood." Spring is the season here alluded to; as at this time, after the sap begins to ascend, the bark is in general very easily separated. But a more important reason may be given for preferring this period, as in spring the active principles deposited in the proper cells of the bark are most abundant: thus, oak bark collected in spring contains four times more tannin than that which is collected in winter.[1]

"LEAVES are to be gathered after the flowers have expanded, and before the seeds are mature." These should be in the most perfect state, free from disease, and full grown.

"FLOWERS are to be gathered when just opened." There is, however, one exception to this rule, namely, the red rose, which must be gathered before the buds are expanded.

"SEEDS are to be collected when they are ripe, and before they drop from the plant. They ought to be preserved in their seed-vessels."

VEGETABILIUM PRÆPARATIO, Lond.

Preparation of Vegetables.

"VEGETABLES, soon after they are gathered, except those which are to be used in the recent state, are to be lightly spread out, and dried as quickly as possible, with a heat so gentle that their colour will not be altered; and then preserved in proper situations or vessels, where the light and moisture are excluded." When plants cannot be dried immediately on being gathered, they should be revived by immersing their stalks in water for twelve hours. When the leaves are the parts intended to be employed, these are then to be carefully freed from the stalks, and laid in thin layers in baskets of willow stripped of its bark, in a drying room kept quite dark. They should then be exposed to a temperature of 140° Fahr.

[1] Vide Biggin's Table, *Phil. Trans.* 1799.

for six or eight hours. When the leaves begin to shrivel, they should be turned, and the same temperature continued until they crumble readily in the hand. When the process has been well conducted, the leaves should retain their green colour and their medicinal properties. The vessels best adapted for preserving them are oil jars made perfectly clean and dry, closely covered and kept in a dry, warm situation. It is better to preserve those leaves, the virtues of which are particularly connected with their colour, namely hemlock and foxglove, in this state, than in the form of powder, a small portion only being occasionally powdered for current use.[1]

"ROOTS, which are required to be preserved fresh, should be buried in dry sand. The SQUILL bulb, before it is dried, is to be denuded of the arid coats, and cut transversely into thin slices. The cormus of colchicum, dug up in July or August, should be cut into thin transverse slices, dried without heat, or in a very gentle heat, and preserved in well-stopped bottles.

"PULPY FRUITS, if they be unripe, or ripe and dried, are to be placed in a damp situation, until they become soft: then the pulp is to be pressed out through a hair sieve; afterwards boiled with a gentle heat, frequently stirring; and, finally, the water evaporated in a water bath, until the pulp acquire a proper consistence.

"Over the bruised pods of CASSIA, pour boiling water, so as to wash out the pulp, which is to be first pressed through a sieve with large holes, and afterwards through a hair sieve; then dissipate the water in a water bath, until the pulp acquire a proper consistence.

"Press through a sieve the pulp or juice of ripe and fresh fruits without boiling them."

VEGETABILIUM EXSICCATIO, Edin.

The drying of Herbs and Flowers.

"HERBS and flowers are to be dried by the gentle heat of a stove or a common fire, in such a quantity at once as will admit of the operation being very quickly finished: for by this means their powers are better preserved; the indication of which is the perfect preservation of their natural colour.

"The leaves of HEMLOCK (*Conium maculatum*), and of other plants containing a subtile, volatile matter, are, when dried, to be immediately reduced to powder, and preserved in well-stopped glass vessels.

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[1] The above is the method adopted by Mr. Battley, of Fore Street, whose attempts to improve this part of Pharmacy deserve the thanks of the profession.

"The root (*bulb*) of the SEA-SQUILL (*Scilla maritima*), freed from its external coat, is to be cut transversely into thin slices. The indication of its being properly dried is the retention of its bitterness and acrimony after it has become friable." The directions of the Dublin College are similar. (See *Pulvis Scillæ* among the powders.) After the squill has been properly dried, in which operation it loses seven eighths of its weight, it must be kept in a dry place, as it is apt to retain its moisture in some degree, and become mouldy. It cannot, however, be long preserved in the state of powder without becoming almost inert.

HERBARUM EXSICCATIO, Dub.

The drying of Herbs.

"PUT the fresh leaves of the herb, gathered when it is in flower, into paper bags, and expose them to a low heat for an hour; then strew them lightly upon a sieve, and dry them as quickly as possible, taking care that their green colour be not injured by too much heat; but if the herbs are to be used under the form of powder, let them be immediately powdered, and the powder preserved in well-closed opaque phials.

"Herbs and flowers from which oils and distilled waters are to be obtained should be dried as soon as they are collected."

PULPARUM EXTRACTIO, Edin.

Extraction of Pulps.

"FRUITS which afford a pulp, if unripe, or if ripe and dry, are to be boiled in a small portion of water, till they become soft; then the pulp is to be pressed through a hair sieve, and afterwards boiled in an earthen vessel with a gentle heat, stirring frequently to prevent it from burning, until it acquire the consistence of honey.

"In like manner the pulp of CASSIA FISTULA is to be boiled out from the bruised pod, and then brought to a proper consistence by evaporating the water.

"The pulps of recent and ripe fruits are to be pressed through a sieve without being previously boiled."

SUCCI SPISSATI, Edin.

Inspissated Juices.

"BEAT the fresh substance, and press it strongly through a canvass bag, in order to obtain the juice; which being put into a wide, shallow vessel, and heated by means of boiling water saturated with sea-salt, is to be reduced to the consistence of honey. The mass when cold is to be put into glazed earthen vessels, and moistened with strong alcohol."

The juices of fresh vegetables obtained by expression contain, besides the sap of which they chiefly consist, mucilage, fecula, extractive matter, and the other proper juices of the plant. When newly expressed, these matters are mixed together, and form a viscid, heterogeneous fluid, which gradually separates by rest into two parts; the one formed of a deposit of all the insoluble components of the juice generally involved in mucilaginous matter; the other a clear liquor, consisting of water, holding some mucilage in solution, with the acids and salts, if any, and other soluble principles of the juice. As the clear liquor is that which is wished to be obtained for medical use, it is separated by first decanting it from the deposit, then filtering it repeatedly through a linen cloth, and adding about one-fortieth part of its weight of alcohol; after which it is allowed to remain at rest for some time, and again filtered previous to being put into the bottles in which it is intended to be preserved. The bottles should be kept in a cool cellar, and sunk up to the neck in sand.

Various other methods, also, are employed for depurating vegetable juices; but as these preparations are now almost obsolete, we do not think it necessary to detail them. By whatever means they are prepared, vegetable juices undergo chemical changes, and spontaneous decompositions from keeping, which must necessarily affect their virtues as medicines. They are, therefore, properly rejected from all the Pharmacopœias.

The articles given in the Edinburgh Pharmacopœia, under the title *Succi spissati*, being associated by the London College with the extracts, and the difference between these preparations being scarcely sufficient to constitute a generic distinction, we have thought it proper not to alter the London arrangement in this respect, and have therefore placed the whole under the title *Extracts.*

VINA.

WINES.

WINE acts upon vegetable substances in nearly the same manner as diluted spirit, dissolving such of their proximate principles as can be taken up by water and alcohol when combined: hence it has been long used as a menstruum for extracting the active parts of medicinal vegetables; and the solutions thus formed have been denominated *Medicated Wines.* As a solvent, however, wine is liable to the objection of inequality of strength; and owing to the spontaneous decomposition which it undergoes from exposure to the air, it is still more objectionable, this change being likely to take place sooner when it is imbued with principles all of which tend to hasten the fermentative process. To remedy these disadvantages in this class of preparations, Parmentier has proposed [1], that instead of preparing medicated wines in the usual method, the alcoholic tinctures well prepared should be added to wine in given quantities: by which means, he contends, that the preparations are less nauseous, and, what is a still greater advantage, are always of a determinate strength. Two of the British Colleges still order medicated wines to be prepared after the old method; and when the vegetable products which are to be taken up are of an alkaline nature, as morphia, veratria, &c., it is still the best method. They should be kept in very well corked bottles, and in a cool situation.

VINUM ALOES, Lond. *Wine of Aloes.*

"Take of powdered aloes, *two ounces;* canella, powdered, *four drachms;* sherry wine, *two pints.* Macerate for fourteen days, frequently shaking, and then filter."

Dublin.

"Take of socotorine aloes, *four ounces;* canella alba, *an ounce;* Spanish white wine, *three pints;* proof spirit, *a pound.* Let the aloes and the canella, separately reduced to powder, be mixed together, and pour on them the wine mixed with the spirit; then digest for fourteen days with frequent agitation; and, lastly, strain the solution."

VINUM ALOES SOCOTORINÆ, Edin. *Wine of Socotorine Aloes.*

"Take of socotorine aloes in powder, *one ounce;* lesser cardamom seeds, bruised, ginger root, bruised, of each *a drachm;* Spanish white wine, *two pounds.* Digest for seven days, shaking the mixture frequently, and strain."

Syn. Vin d'Aloë (*F.*), Vino Aloetico (*I.*).

Wine is an excellent solvent of aloes, and, therefore, these preparations contain all the virtues of the remedy in a concentrated state.

Medical properties and uses.—Wine of aloes is an excellent warm purgative and stomachic. It has long been employed with benefit in cold phlegmatic habits, in cases of paralysis, gout, dyspepsia, and chlorosis. The dose is from f ℥j. to

[1] *Annales de Chimie,* lii. 46.

f ʒij. to act as a stomachic, and from f ℥ ss. to f ℥ ij. to produce purging.

Aloes are advantageously combined with alkalies; and in this state I have long been in the habit of employing a wine containing aloes and myrrh, in dyspepsia and chlorosis; and, also, in that affection of the mesenteric glands in children which produces a tumid and tense abdomen. The following is the formula I employ, which was copied, with some modification, from a very old pharmacopœia, which accidentally fell into my hands; but of the date of which I have unfortunately preserved no memorandum:—

℞ Sodæ subcarbonatis ℥ iij.
Ammoniæ carbonatis ʒivss.
Myrrhæ ʒvj.
Aloes extracti ʒvj.
Vini albi (*sherry, Anglicè*) f℥xxiv.

Macera per dies septem, et cola.

The dose is from one fluid drachm to half a fluid ounce.

VINUM COLCHICI, Lond. *Wine of Colchicum.*

"Take of the dried cormus of colchicum, sliced, *eight ounces;* sherry wine, *two pints.* Macerate for fourteen days, and filter."

The medicinal power of the bulb of colchicum depends on veratria. It is combined, in the cormus of colchicum, with a large quantity of starch, some mucilage and gluten, gallic acid, and much water, the proportion of which differs considerably in different bulbs, according to the moist or dry nature of the soil in which they have grown, and the season of the year in which they are dug up for use.

When the dried bulb, taken up at a proper season, is employed, the strength of the preparation is likely to be uniform.

The London formula is a modification of the following process, recommended for the preparation of the wine of *colchicum:*—Take of the bulbs of colchicum (dug up in July or August), sliced transversely and dried without heat, or at a temperature not exceeding 110°, *two ounces and a half;* pulverize them, and pour upon the powder put into a glass bottle *twelve ounces* of good sherry wine. Agitate the mixture twice a day for seven days, and then filter for use.

Medical properties and uses.—Wine of colchicum is a powerful sedative and purgative. It is administered with great advantage in inflammatory and painful nervous affections connected with a disordered state of the liver; as, for example, gout and acute rheumatism; diminishing the force and frequency of the pulse, allaying the pain, and cutting short the paroxysm; but it rarely produces a permanently favourable result without stimulating the duodenum and biliary ducts, and producing a copious discharge of bilious stools. It is apt to nauseate the stomach; a property which is subdued by combining it with magnesia: but in some habits even this does not correct its nauseating qualities, and its use is followed by great faintness and depression of nervous power. The dose of wine of colchicum is from ♏xxx. to f ℨ jss. given in conjunction with magnesia in water or in the infusion of cinchona bark, of gentian root, or any other bitter.

VINUM GENTIANÆ COMPOSITUM, Edin. *Compound of Wine of Gentian.*

"Take of gentian root, *half an ounce;* cinchona bark, *one ounce;* orange peel, dried, *two drachms;* canella alba, *one drachm;* proof spirit, *four ounces;* Spanish white wine, *two pounds and a half.* First pour the proof spirit on the root and the bark sliced and bruised, and after twenty-four hours add the wine; then macerate for seven days, and strain."

Syn. Vin de Gentiane composé (*F.*), Vino di Genziana composto (*I.*).

This wine, when newly prepared, is stomachic and tonic; but, by keeping, it is very apt to become acescent. The dose is from f ℨ iv. to f ℨ vj., given two or three times a day.

VINUM IPECACUANHÆ, Lond. *Wine of Ipecacuanha.*

"Take of ipecacuanha, bruised, *two ounces and a half;* sherry wine, *two pints.* Macerate for fourteen days, and filter."

Edinburgh.

"Take of the root of ipecacuanha, bruised, *one part;* Spanish white wine, *fifteen parts.* Macerate for seven days, and filter through paper."

Dublin.

"Take of the root of ipecacuanha, bruised, *two ounces;* Spanish white wine, *two pints.* Digest for seven days, then filter."

Syn. Vin d'Ipecacuanha (*F.*), Vino con Ipecacuana (*I.*).

From my trials, I find that a pint of sherry wine takes up 100 grains of ipecacuanha, which is the larger proportion of the soluble matter contained in an ounce of the root; and as the active part of the root, or emetina[1], is more soluble in acetic acid than in any other menstruum, the acescency of the wine is no objection. Dr. Irvine says, that 30 grains of the root administered in f ℥ ij. of vinegar produced only some loose stools: but, if acetate of emetina produces vomiting, what is the cause of the inertness of this mixture? Does the solution

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[1] Emetina was discovered by MM. Dumas, and Pelletier; and, according to their analysis, it consists of carbon 64·57, azote 4·30, hydrogen 7·77, and oxygen 22·95, in 100 parts.

of the starch and the gum in the acid form a substance which obtunds the action of the acetate of emetina? As an emetic, ipecacuanha wine is equally efficacious with antimonial wine, and at the same time milder in its operation, and is, therefore, better adapted for infants. For this purpose a teaspoonful, or f ʒ ss., is given for a dose, and repeated every ten minutes till it operate. In smaller doses, from ♏ x. to ♏ xx., it answers the same purposes as the powder, and is given in coughs, diarrhœa, dysentery, and other complaints in which a determination of the skin is indicated.

VINUM NICOTIANÆ TABACI, Edin. *Wine of Tobacco.*

"Take of tobacco leaves, *one part;* Spanish white wine, *twelve parts.* Macerate for seven days, and filter through paper."

This is the only form in which tobacco can be conveniently exhibited as an internal remedy. It is given to produce diuretic and antispasmodic effect in dropsies, colica pictonum, and ileus. The dose is from ♏ x. to ♏ xxx., in any proper vehicle."

VINUM OPII, Lond. Edin. *Wine of Opium.*[1]

"Take of purified extract of opium, *two ounces and a half;* cinnamon, bruised, cloves, bruised, of each, *two drachms and a half;* sherry wine, *two pints.* Macerate for eight days (seven days, *Edin.*), and filter."

VINUM OPII, Dub. *Wine of Opium.*

"Take of Turkish opium, *one ounce;* bruised cinnamon bark, bruised cloves, each *one drachm;* Spanish white wine, *a pint.* Macerate for eight days, and filter."

Syn. Vin d'Opium aromatique (*F.*), Vino aromo Opiato (*I*).

The aromatics which this preparation contains are supposed to modify the action of the opium, and prevent the disturbance of the brain and nervous system, which the simple tincture is apt to induce in nervous habits, and where the head is much affected. It is intended to supply the place of the liquid laudanum of Sydenham; but that preparation contained double the quantity of opium, and ʒ j. of saffron, which is altogether omitted in the formulæ of the colleges.[2] Mr. Ware introduced the use of this preparation, as a local application in the second stage of ophthalmia; when the inflammatory symptoms have subsided, and the vessels of the conjunctiva

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[1] Laudanum liquidum Sydenhami, P. L. 1720.

[2] The following is Sydenham's formula: — ℞ Vini Hispanici ℔ j. Opii ℥ ij. Croci ʒ j. pulv. Cinnamomi et Caryophyllarum ā. ā. ʒ j. Infundantur simul in B. M. per duas vel tres dies, donec liquor debitam consistentiam acquirat. Colitura servetur pro usu. *Sydenhami Opera Omnia*, Lond. 1705, p. 147.

remain turgid with blood. Two or three drops are poured into the eye every morning, until the redness be removed.

VINUM RHEI, Edin. *Wine of Rhubarb.*

"Take of rhubarb root, sliced, *two ounces;* canella bark, bruised, *a drachm;* proof spirit, *two ounces;* Spanish white wine, *fifteen ounces.* Macerate for seven days, and filter through paper."

This wine, when newly prepared, has the same properties, and may be applied to the same uses as the tincture, but it is liable to undergo decomposition. The dose is from f ℥ ss. to f ℥ j., or more.

VINUM VERATRI, Lond. *Wine of White Hellebore.*

"Take of white hellebore, sliced, *eight ounces;* sherry wine, *two pints.* Macerate for fourteen days, and filter."

A solution of white hellebore in wine contains *veratria*, the active principle of the root, in which it is combined with gallic acid.[1] I have no doubt that a vinous preparation of white hellebore, exhibited with due caution, would answer every purpose of the *wine of colchicum.* Wine of white hellebore is seldom employed.

The dose is ten minims, gradually increased to thirty.

UNGUENTA.

OINTMENTS.

THESE are unctuous substances, of nearly the same nature as cerates, but having a consistence much less firm, scarcely exceeding that of butter.

UNGUENTUM ANTIMONII POTASSIO-TARTRATIS, Lond. *Ointment of Potassio-Tartrate of Antimony.*

"Take of potassio-tartrate of antimony, rubbed to powder, *an ounce;* lard, *four ounces.* Mix."

This ointment is an excellent counter-irritant, bringing out a crop of pustules when it is rubbed on the skin. The part should be rubbed so as to be reddened before the ointment is applied.

UNGUENTUM ACIDI NITROSI, Edin. *Ointment of Nitrous Acid.*

"Take of hog's lard, *one pound;* nitrous acid, *six drachms.* Mix the acid gradually with the melted lard, and beat the mixture assiduously as it cools."

UNGUENTUM ACIDI NITRICI, Dub. *Nitric Acid Ointment.*

"Take of olive oil, a *pound;* prepared hog's lard, *four*

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[1] Veratria, like the other newly discovered vegetable alkalies, is a compound substance; and, according to the analysis of Dumas and Pelletier, consists of carbon 66·75, nitrogen 5·04, hydrogen 8·54, and oxygen 19·6, in 100 parts.

ounces; nitrous acid, *an ounce by weight.* Melt the oil in a glass vessel, and add the acid to it; let them be exposed to a medium heat in a water bath for a quarter of an hour; then remove them from the bath, and stir them constantly with a glass rod until they become firm."

In this process the acid is partially decomposed, nitrous gas is evolved, and the ointment is oxidized, assuming a yellow colour and a firm consistence. It was invented by Alyon, who found it useful in syphilitic and herpetic ulcers; and it has been occasionally used in this country for the same purposes; but it is less useful than the ointment of nitrate of mercury.

UNGUENTUM ACIDI SULPHURICI, Dub. *Ointment of Sulphuric Acid.*

"Take of sulphuric acid, *a drachm;* prepared hog's lard, *an ounce.* Mix."

Sulphurous acid is given off during the preparation of this ointment, and the lard is charred. It is black and fœtid. It has been used in scabies: but is almost obsolete.

UNGUENTUM CANTHARIDIS [1], Lond. *Blistering Ointment.*

"Take of blistering flies, finely powdered, *an ounce;* distilled water, *four fluid ounces;* resin cerate, *four ounces.* Boil the water with the blistering flies to half its quantity, and strain. Mix the cerate into the strained liquor, and evaporate it to a proper consistence."

Syn. Kantharidensalbe (*G.*).

UNGUENTUM INFUSI CANTHARIDIS VESICATORIÆ, Edin. *Ointment of Infusion of Blistering Flies.*

"Take of blistering flies, resin, yellow wax, of each *one part;* Venice turpentine, hog's lard, of each *two parts;* boiling water, *four parts.* Macerate the flies in the water for a night, and strain the liquor, expressing it strongly; add the liquor to the fat, and boil until the water be evaporated; then add the wax and the resin, and when these are melted, remove the mixture from the fire; add the Venice turpentine, and mix."

These ointments are sufficiently mild, but they do not always succeed in keeping open a blistered surface. Little efficacy can be ascribed to the blistering flies, much of the acrimony of which is destroyed by the heat employed for the evaporation of the water.[2]

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[1] Unguentum cantharidis, P. L. 1787.

[2] Galen employed an ointment made by macerating the entire insect in melted lard for twenty-four hours, and then straining by expression. Boerhaave proposed to boil the flies in water, then to pour off the liquid, and make an ointment of the boiled insects with the addition of lard.

UNGUENTUM PULVERIS CANTHARIDIS VESICATORIÆ, Edin. *Ointment of the Powder of Blistering Flies.*

"Take of resinous ointment, *seven parts;* powdered blistering flies, *one part.* Sprinkle the powder into the melted ointment; and stir the mixture until it stiffen in cooling."

UNGUENTUM CANTHARIDIS, Dub. *Ointment of Blistering Flies.*

"Take of ointment of yellow wax, *half a pound;* blistering flies, in powder, *one ounce.* Form them into an ointment."

These ointments are intended for promoting a purulent discharge from blistered surfaces; and produce this effect sufficiently well when the irritation they excite can be supported, which, however, cannot always be done. The flies should be reduced to a very fine powder, and very intimately mixed with the ointment.

UNGUENTUM CERÆ FLAVÆ, Dub. *Ointment of Yellow Wax.*

"Take of purified yellow wax, 142°, *a pound;* prepared hog's lard, 97°, *four pounds.* Form them into an ointment."

UNGUENTUM CERÆ ALBÆ, Dub. *Ointment of White Wax.*

"This is to be prepared in the same manner as the former, with the substitution of white for yellow wax."

These are useful dressings to benign ulcers and excoriations, and form the basis of the majority of the compound ointments of the Dublin Pharmacopœia.

UNGUENTUM CETACEI[1], Lond. *Spermaceti Ointment.*

"Take of spermaceti, *six drachms;* white wax, *two drachms;* olive oil, *three fluid ounces.* Melt them together over a slow fire, and stir them constantly until they be cold."

UNGUENTUM CETACEI, Dub. *Ointment of Spermaceti.*

"Take of white wax, *half a pound;* spermaceti, *a pound;* prepared lard, *three pounds.* Make them into an ointment."

These ointments form the ordinary dressings for healing blistering surfaces and excoriations.

UNGUENTUM CREASOTI, Lond. *Ointment of Creasote.*

"Take of creasote, *a fluid drachm;* lard, *an ounce.* Rub and mix."

A useful stimulant ointment in porrigo scutulata.

UNGUENTUM ELEMI[2], Lond. *Ointment of Elemi.*

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[1] Unguentum spermaceti, P. L. 1787.

[2] Unguentum e gummi elemi, P. L. 1745. Unguentum elemi comp., P. L. 1824.

"Take of elemi, *a pound;* common turpentine, *ten ounces;* prepared suet, *two pounds;* olive oil, *two fluid ounces.* Melt the elemi with the suet; then remove it from the fire, and mix in immediately the turpentine and the oil; lastly, strain the mixture through a linen cloth."

UNGUENTUM ELEMI, Dub. *Ointment of Elemi.*

"Take of elemi resin, *a pound;* white wax, *half a pound;* prepared hog's lard, *four pounds.* Form them into an ointment, which is to be strained through a sieve while it is hot."

Syn. Onguent d'Elemi et de Térébenthine (*F.*), Elemisalbe (*G.*), Unguento di Elemi e Trementina (*I.*).

These ointments are stimulant and digestive. They are used to keep open issues and setons; and as a dressing to ulcers which do not admit of the application of the adhesive straps.

UNGUENTUM HYDRARGYRI FORTIUS[1], Lond. *Strong Mercurial Ointment.*

"Take of purified mercury, *two pounds;* prepared lard, *twenty-three ounces;* prepared suet, *an ounce.* First rub the mercury with the suet, and a little of the lard, until the globules disappear; then add the remainder of the fat, and mix."

Two drachms of this ointment contain one drachm of mercury.

UNGUENTUM HYDRARGYRI, Edin. *Mercurial Ointment.*

"Take of mercury, mutton suet, of each *one part;* hog's lard, *three parts.* Rub the mercury diligently in a mortar, with a little of the hog's lard, until the globules disappear; then add the remainder of the lard.

"It may also be made with double or treble the quantity of mercury."

One drachm of this ointment contains twelve grains of mercury.

Dublin.

"Take of purified mercury, prepared hog's lard, *equal weights.* Rub them together in a marble or an iron mortar until the globules disappear."

Syn. Onguent Mercuriale (*F.*), Quecksilbersalbe (*G.*), Unguento Mercuriale (*I.*).

One drachm of this ointment contains thirty grains of mercury.

UNGUENTUM HYDRARGYRI MITIUS[2], Lond. Dub. *Milder Mercurial Ointment.*

"Take of the stronger mercurial ointment, *a pound;* prepared lard, *two pounds.* Mix them."

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[1] Ung. cæruleum fortius, P. L. 1745.

[2] Unguentum cæruleum mitius, P. L. 1745.

One drachm of this ointment contains ten grains of mercury; but prepared according to the Dublin Pharmacopœia, with two parts of lard to one of mercury, one drachm contains a scruple of mercury.

The preparation of the stronger mercurial ointments requires much labour, care, and patience. During the trituration the mercury is mechanically divided into minute globules, which are prevented from running together again by the viscosity of the suet. They are by some supposed to be gradually oxidized, during the trituration, by the atmosphere; the lard, the extension, and the constant renewal of the surface exposed, favouring very much this effect. The fact of the oxidizement of the metal in this process, however, has been often questioned; and some experiments of M. Roux have thrown much light on the subject. That chymist triturated mercury and maltha, a species of pitch, in a vacuum, and produced the extinction of the metal as well as if the operation had been performed in the air; thence he concludes that the metal is not oxidized, but merely mechanically divided in the ointment. There are still, however, some difficulties in deciding this point. Whatever tends to favour oxidation, as for instance a slight degree of rancidity of the lard, or the oil of eggs, shortens the time, and lessens the labour, required for the preparation of the ointment. It is not uncommon, however, to use other means, which are not admissible, to facilitate the process, such as the use of sulphur or turpentine. The first may be detected by the very black colour of the ointment, which is produced by the sulphuret of mercury; and also by the sulphurous odour exhaled, when a paper covered with a little of it is held over the flame of a candle; and the turpentine is detected by its odour also, when the ointment containing it is treated in the same manner. When newly prepared, mercurial ointment has a light grey or bluish colour; this has been ascribed to its containing some unoxidized metal, which separates in globules when it is liquefied by a gentle heat; when kept for some time the colour is much deepened, and less metallic mercury subsides, owing to the more complete oxidizement of the metal. As it is of great consequence to procure so important a preparation always of the same degree of strength, and as this can never be accomplished by the present method of preparing the ointment, Mr. Donovan has proposed to prepare it by using black oxide of mercury, at the temperature of 350° Fahrenheit, continuing the friction for two hours. By this method of proceeding, Mr. Donovan found that every ounce of lard dissolves and combines with twenty-one grains of oxide; that the ointment thus prepared can be introduced into the habit in one third of the time required by the common ointment; and that it is equally efficient with the officinal preparation.

Medical properties and uses.—The strong mercurial ointment rubbed upon the skin introduces a large quantity of mercury into the system. About ʒ j. is rubbed upon the inside of the thighs, or any other part of the body where the cuticle is thin, every night and morning, until the system is affected. The ointment is absorbed during the friction, which slightly abrades the cuticle, and admits it to the mouths of the absorbents, so as to permit it to be carried into the habit; where it produces the same effects as those which result from taking mercurials by the mouth, without the unpleasant affection of the bowels that very commonly follows the introduction of preparations of mercury into the stomach. In order, however, to produce the full effect of the friction, it must be continued until every particle of the ointment disappear; and the operation should be performed by the patient himself. The stronger mercurial ointment is used in this form as an antisyphilitic, as a deobstruent in hepatic affections, and to excite the absorbents in hydrocephalus. The weaker ointment is used only as a topical dressing in venereal sores. During a course of mercurials the patient should be kept in a moderately warm and dry, but airy chamber; and his diet should be chiefly weak broths, milk, and gruel.

The following table shows at one view the quantity of mercury contained in each of the different ointments ordered by the British Colleges.

one drachm	of the Lond.	stronger ointment contains of merc.	30 grs.
		weaker ointment	10
	of the Edin.	common ointment	12
	of the Dub.	stronger ointment	30
		weaker ointment	20

UNGUENTUM OXIDI HYDRARGYRI CINEREI, Edin. *Ointment of Grey Oxide of Mercury.*

"Take of grey oxide of mercury, *one part;* hog's lard, *three parts.* Mix."

Syn. Graue Quecksilbersalbe (*G.*).

As the whole of the mercury in this ointment is oxidized, it might, *à priori*, be supposed that it would answer all the purposes of the mercurial ointment: but it cannot be so easily introduced by friction, the oxide remaining on the surface of the cuticle after the unctuous matter is absorbed. Dr. Paris justly remarks, that this is owing to its being a mechanical mixture instead of a chymical combination: an opinion, however, which is rendered doubtful by the experiments made to prove the non-oxidation of the mercury in the preparation of the mercurial ointment. It has been too seldom employed to enable a correct judgment to be formed of its efficacy.

UNGUENTUM HYDRARGYRI NITRATIS, Lond. *Ointment of Nitrate of Mercury.*

"Take of mercury, *an ounce;* nitric acid, *eleven fluid drachms;* lard, *six ounces;* olive oil, *four fluid ounces.* First dissolve the mercury in the acid; then mix the solution while it is hot, with the lard and oil melted together."

UNGUENTUM NITRATIS HYDRARGYRI FORTIUS; vulgo, UNGUENTUM CITRINUM, Edin. *Stronger Ointment of Nitrate of Mercury.*

"Take of purified mercury, *one part;* nitrous acid, *two parts;* olive oil, *nine parts;* hog's lard, *three parts.* Dissolve the mercury in the acid; then beat up the solution strongly with the lard and oil previously melted together, and nearly cold, in a glass mortar, so as to form an ointment."

UNGUENTUM NITRATIS HYDRARGYRI; vulgo, UNGUENTUM CITRINUM, Dub. *Ointment of Supernitrate of Mercury.*

"Take of purified mercury, *an ounce;* nitric acid, *eleven drachms and a half;* olive oil, *one pint;* hog's lard, *four ounces.* Dissolve the mercury in the acid; then mix the solution with the oil and lard previously melted together, and form an ointment in the same manner as the ointment of nitrous acid."

Syn. Onguent citrin (*F.*), Gelbe Quecksilbersalbe (*G.*), Unguento Citrino (*I.*).

UNGUENTUM NITRATIS HYDRARGYRI MITIUS, Edin. *Milder Ointment of Nitrate of Mercury.*

"It is made in the same manner as the stronger ointment, with a triple proportion of oil and lard."

In all of these formulæ too large a proportion of lard is used; for the excess of acid in the metallic solution oxidizing the fatty matters, occasions them to become too hard and brittle after the ointment has been kept for some time, when more than one sixth of lard is employed. The addition of the metallic solution to the melted mixture of lard and oil should be gradual, and made in a broad flat vessel, so as to expose a large surface to the action of a current of air; while the stirring should be performed with a wooden spatula, and continued until the ointment be perfectly cold.

When prepared in the above manner, and with one sixth part only of lard, this ointment has a beautiful golden colour, and is of the consistence of butter, which it retains if preserved in close pots; but when made with a larger proportion of lard, it becomes hard, brittle, and of a pale, dirty yellow hue, marbled with green blotches.

Mr. Duncan of Edinburgh prepares this ointment with ℥xij. of nitrous acid, ℥iv. of mercury, ℥xxvjss. of olive oil, and ℥xij. of lard. He pours the solution of mercury, still hot, into the lard melted in the oil, and still hot, and mixes them, assisting the combination by heat if it does not froth up. The vessel should be large, as a violent effervescence takes place. This ointment preserves its colour and consistence.

Medical properties and uses. — This ointment is stimulant and detergent. When moderately diluted with lard it is a local remedy of great efficacy in herpes, psoriasis, porrigo, and other cutaneous eruptions. The weaker ointment may almost be regarded as a specific in psorophthalmia, in the purulent ophthalmia of infants producing ectropium, and in ulcerations of the tarsi. It is applied by taking a little on the finger, liquefying it by the fire or the flame of a candle, and applying it along the inner part of the eyelids.

UNGUENTUM GALLÆ, Edin. *Ointment of Galls.*

"Take of galls, in fine powder, *one part*; lard, *eight parts*; Mix."

This is a very useful application in piles, and has long been employed, although it has not until lately obtained a place in the Pharmacopœia.

UNGUENTUM HYDRARGYRI NITRICO-OXYDI, Lond. *Ointment of Nitric Oxide of Mercury.*

"Take of nitric oxide of mercury, *an ounce*; white wax, *two ounces*; lard, *six ounces.* Melt together the wax and lard, then add the nitric oxide of mercury in very fine powder, and mix."

UNGUENTUM OXIDI HYDRARGYRI RUBRI, Edin. *Ointment of Red Oxide of Mercury.*

"Take of red oxide of mercury by nitric acid, in fine powder, *one part*; hog's lard, *eight parts.* Mix."

UNGUENTUM HYDRARGYRI OXIDI NITRICI, Dub. *Ointment of Nitric Oxide of Mercury.*

"Take of prepared lard, *six ounces*; white wax, *two ounces*; nitric oxide of mercury, *an ounce.* Form them into an ointment."

Syn. Rothe Quecksilbersalbe (*G.*).

These are excellent stimulant ointments, well adapted for giving energy to indolent, foul ulcers. They are also of great use in inflammation of the conjunctiva, with a thickening of the inner membrane of the palpebræ; and to specks of the cornea. They are to be applied in the same manner as the ointment of nitrate of mercury.

UNGUENTUM HYDRARGYRI AMMONIO-CHLORIDI [1], Lond. *Ointment of Ammonio-chloride of Mercury.*

"Take of ammonio-chloride of mercury, *a drachm*; pre-

[1] Unguentum e mercurio præcipitato albo, P. L. 1745. Ung. calcis hydrargyri albi, P. L. 1787. Ung. hydrargyri præcipitati albi, P. L. 1824.

pared lard, *an ounce and a half.* Add the ammonio-chloride of mercury to the lard previously melted by a gentle heat, and mix."

UNGUENTUM SUBMURIATIS HYDRARGYRI AMMONIATI, Dub. *Ointment of Ammoniated Submuriate of Mercury.*

"Take of prepared lard, *an ounce and a half;* ammoniated submuriate of mercury, *a drachm.* To the melted lard, as it begins to cool, add the submuriate, and mix."

These ointments are stimulant and detergent. They are recommended by Werlhoff, and some other German authors, as a remedy for the itch. They may be safely used on infants.

UNGUENTUM HYDRARGYRI IODIDI, Lond. *Ointment of Iodide of Mercury.*

UNGUENTUM HYDRARGYRI BINIODIDI, Lond. *Ointment of Biniodide of Mercury.*

These ointments are prepared in the same manner as the ointment of nitric oxide of mercury.

UNGUENTUM JUNIPERI SABINÆ, Edin. *Ointment of Savine.*

"Take of fresh leaves of savine, *two parts;* yellow wax, *one part;* lard, *four parts.* Melt the wax and lard together; then boil the leaves in the mixture, and express through a cloth."

This ointment is intended for keeping a blistered surface discharging, and answers the purpose of the cerate of savine.

UNGUENTUM IODINII COMPOSITUM, Lond. *Compound Ointment of Iodine.*

"Take of iodine, *half a drachm;* iodide of potassium, *a drachm;* rectified spirit, *a fluid drachm;* lard, *two ounces.* First rub the iodine and iodide of potassium with the spirit, then mix them with the lard. A useful topical application in bronchocele, and swelled glands. It is rendered more efficacious by combining it with an equal weight of mercurial ointment."

UNGUENTUM IODINII, Dub. *Iodine Ointment.*

"Take of iodine, *a scruple;* prepared lard, *an ounce.* Rub them together to make an ointment."

UNGUENTUM POTASSÆ HYDRIODATIS, Dub. *Ointment of Hydriodate of Potassa.*

"Take of the hydriodate, *a scruple;* prepared lard, *an ounce.* Rub them together to make an ointment."

These are useful forms for the external employment of iodine. The first is the most active.

UNGUENTUM PICIS LIQUIDÆ[1], Lond. *Tar Ointment.*

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[1] Unguentum e pice, P. L. 1745. Unguentum picis, P. L. 1787.

"Take of tar, suet, of each *a pound.* Melt them together, and strain the mixture through a linen cloth."

UNGUENTUM PICIS LIQUIDÆ, Edin. *Tar Ointment.*

"Take of tar, *five parts;* yellow wax, *two parts.* Melt the wax with a gentle heat; then add the tar, and stir until the mixture stiffen in cooling."

UNGUENTUM PICIS LIQUIDÆ, Dub. *Tar Ointment.*

"Take of tar, mutton suet, of each *half a pound.* Melt them together, and strain them through a sieve."

Although the pitch and the tar ointments differ in their sensible qualities, yet they are both used with advantage as detergents in scabby, foul eruptions, lepra, and tinea capitis.

UNGUENTUM PICIS NIGRÆ, Lond. *Ointment of Black Pitch.*

"Take of black pitch, wax, resin, of each *nine ounces,* olive oil, *sixteen fluid ounces.* Melt them together, and strain through a linen cloth."

This ointment is digestive and stimulant.

UNGUENTUM PIPERIS NIGRI, Dub. *Ointment of Black Pepper.*

"Take of prepared hog's lard, *a pound;* black pepper, in powder, *four ounces.* Form them into an ointment."

We are ignorant of the purpose for which this irritating ointment is designed.

UNGUENTUM PLUMBI COMPOSITUM, Lond. *Compound Ointment of Lead.*

"Take of prepared chalk, *eight ounces;* distilled vinegar, *six fluid ounces;* plaster of lead, *three pounds;* olive oil, *a pint.* Melt the plaster in the oil with a slow fire; then gradually add the chalk separately mixed with the vinegar, the effervescence being finished, and stir constantly until they are cooled."

A dressing in indolent ulcers.

UNGUENTUM PLUMBI CARBONATIS, Edin. *Ointment of Carbonate of Lead.*

"Take of simple ointment, *five parts;* carbonate of lead, *one part.* Mix."

Dublin.

"Take of ointment of white wax, *a pound;* carbonate of lead, reduced to fine powder, *two ounces.* Form them into an ointment."

Syn. Onguent blanc (*F.*), Bleiweissalbe (*G.*), Unguento bianco (*I.*).

These are useful, cooling, desiccative ointments.

UNGUENTUM PLUMBI ACETATIS, Dub. *Ointment of Acetate of Lead.*

"Take of ointment of white wax, *a pound and a half;* acetate of lead, *one ounce.* Make them into an ointment."

UNGUENTUM PLUMBI IODIDI, Lond. *Ointment of Iodide of Lead.*

"Take of iodide of lead, *an ounce;* lard, *eight ounces.* Rub together and mix." An excellent ointment in swelled glands and scrofulous tumours. It produces no effect similar to that of carbonate of lead on the habit.

UNGUENTUM OXIDI ZINCI IMPURI, Edin. *Ointment of impure Oxide of Zinc.*

"Take of simple liniment, *five parts;* prepared oxide of zinc, *one part.* Mix."

UNGUENTUM TUTIÆ, Dub. *Ointment of Tutty.*

"Take of ointment of white wax, *ten ounces;* prepared tutty, *two ounces.* Form them into an ointment."

Syn. Onguent de Tuthie (*F.*), Unguento di Tuzia (*I.*).

These ointments were formerly much used in ophthalmia tarsi; but they are now seldom employed.

UNGUENTUM RESINÆ ALBÆ, Dub. *Ointment of White Resin.*

"Take of yellow wax, *a pound;* white resin, *two pounds;* prepared lard, *four pounds.* Make an ointment; and while it is hot pass it through a sieve."

UNGUENTUM SABINÆ, Dub. *Savine Ointment.*

"Take of the fresh leaves of savine, freed from the stalks and bruised, *half a pound;* prepared lard, *two pounds;* yellow wax, *half a pound.* Boil the leaves in the lard until they are crisp, then strain by expression. Finally, melt, and add the wax."

This is an useful ointment when fresh prepared, but it does not keep.

UNGUENTUM SAMBUCI[1], Lond. *Ointment of Elder.*

"Take of elder, lard, of each *two pounds.* Boil the elder flowers in the lard until they become crisp; then strain through a linen cloth."

Dublin.

"Take of fresh elder flowers, *three pounds;* prepared hog's lard, *four pounds;* mutton suet, *two pounds.* Make an ointment of these in the manner directed for the preparation of the savine ointment."

These ointments are simply emollient, and possess no advantages over simple ointment. They are vestiges of the redundant practice of former times.

UNGUENTUM SIMPLEX, Edin. *Simple Ointment.*

"Take of olive oil, *five parts;* white wax, *two parts.* Melt the wax in the oil; then stir the mixture until it stiffen in cooling."

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1 Unguentum sambucinum, P. L. 1720.

A useful emollient ointment for softening the skin.

Officinal preparations. — *Unguentum Oxidi Plumbi albi*, E. *Unguentum Acetatis Plumbi*, D.

UNGUENTUM SUBACETATIS CUPRI, Edin. *Ointment of Subacetate of Copper.*

"Take of resinous ointment, *fifteen parts;* subacetate of copper, *one part.* Sprinkle the subacetate into the melted ointment, and stir until the mixture stiffen in cooling."

UNGUENTUM ÆRUGINIS, Dub. *Ointment of Verdegris.*

"Take of ointment of white wax, *a pound;* prepared verdegris, *half an ounce.* Make them into an ointment."

Syn. Unguento Egiziaco (*I.*).

These ointments are escharotic and detergent. They are used as an occasional dressing to foul, flabby ulcers; and as an application to scrofulous ulcerations of the tarsi. They can scarcely be used in the undiluted state, unless to act as a caustic for taking down fungous flesh.

UNGUENTUM SULPHURIS, Lond. *Sulphur Ointment.*

"Take of sulphur, *three ounces;* lard, *half a pound;* oil of bergamot, *twenty minims.* Mix them."

Edinburgh.

"Take of hog's lard, *four parts;* sublimed sulphur, *one part.* Mix."

Dublin.

"Take of prepared hog's lard, *four pounds;* sublimed sulphur, *a pound.* Form them into an ointment."

Syn. Onguent soufré (*F.*), Schemfelsalbe (*G.*), Unguento solforato (*I.*).

These ointments are specific in itch. They should be rubbed on the body every night until the disease be cured, but not more than one fourth part of the body should be covered with it at a time.[1]

UNGUENTUM SULPHURIS COMPOSITUM, Lond. *Compound Ointment of Sulphur.*

"Take of sublimed sulphur, *half a pound;* white hellebore root, in powder, *two ounces;* nitrate of potassa, *a drachm;* soft soap, *half a pound;* lard, *a pound and a half;* oil of bergamot, *thirty minims.* Mix them."

Syn. Onguent soufré composé (*F.*), Unguento solforato composto (*I.*).

This ointment is employed in the same cases as the simple ointment. It is supposed to derive more efficacy from the

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[1] As the smell of the sulphur ointment is objected to by many people, the following combination has been recommended:—

"Take of carbonate of potassa, *half an ounce;* rose water, *one ounce;* red sulphuret of mercury, *one drachm;* essential oil of Bergamot, *half a fluid drachm;* sublimed sulphur, hog's lard, of each *eleven ounces.* Mix them." — *Bateman on Cutaneous Diseases*, p. 200. note.

addition of the white hellebore, but it often excites too much irritation.

UNGUENTUM TARTARI EMETICI, Dub. *Tartar Emetic Ointment.*

"Take of tartrate of antimony and potassa, *a drachm;* prepared lard, *an ounce.* Rub the salt into a fine powder, then add it to the lard, and mix."

A useful counter-irritant; a little white sugar increases its activity.

UNGUENTUM VERATRI, Lond. *Ointment of White Hellebore.*[1]

"Take of white hellebore root, powdered, *two ounces;* lard, *eight ounces;* oil of lemon, *twenty minims.* Mix them."

Dublin.

"Take of prepared lard, *a pound;* white hellebore root, in powder, *three ounces.* Make them into an ointment."

These ointments are sometimes used for the cure of scabies, when the smell of the sulphur ointment is objected to; but they are less certain remedies.

UNGUENTUM ZINCI, Lond. *Zinc Ointment.*

"Take of oxide of zinc, *an ounce;* lard, *six ounces.* Mix them."

UNGUENTUM OXIDI ZINCI, Edin. *Ointment of Oxide of Zinc.*

"Take of simple liniment, *six parts;* oxide of zinc, *one part.* Mix."

Dublin.

"Take of ointment of white wax, *a pound;* oxide of zinc, *an ounce and a half.* Make them into an ointment."

Syn. Onguent de Zinc (*F.*), Zinksalbe (*G.*), Unguento di Zinco (*I.*).

These ointments are moderately astringent and stimulant. They are generally applied in chronic inflammation of the eye, depending on a relaxed state of the vessels; we find them also of very considerable use in sore nipples; and for removing ring-worm, particularly when it attacks the scalp.

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[1] Unguentum hellebori albi, P. L. 1787.

TABLE

Showing the Proportion in which Opium and certain Preparations of Iron, Antimony, Arsenic, Iodine, and Mercury are contained in some compound Medicines.

OPIUM.

CONFECTIO OPII, Lond. *Confection of Opium.* Thirty-six grains contain one grain of opium.

ACETUM OPII, Dub. *Vinegar of Opium* contains seven grains and a half of extract in each drachm.

ELECTUARIUM OPIATUM, Edin. *Opiate Electuary* contains in each drachm about one grain and a half of opium.

ELECTUARIUM CATECHU COMPOSITUM, Edin. *Electuary of Catechu* contains in each ounce about two grains and a half of opium; or one hundred and ninety-three grains contain one grain of opium.

ELECTUARIUM CATECHU COMPOSITUM, Dub. *Compound Electuary of Catechu* contains in each ounce about two grains and a half of purified opium.

PILULÆ SAPONIS CUM OPIO, Lond. Dub. *Pills of Soap and of Opium.* Five grains contain one grain of opium.

PILULÆ OPIATÆ, Edin. *Opiate*, formerly *Thebaic pills.* Each drachm contains six grains of opium. A pill of five grains contains half a grain of opium.

PILULÆ STYRACIS, Dub. *Storax Pills* contain, in five grains of the mass, one grain of purified opium.

PULVIS CORNU USTI CUM OPIO, Lond. *Powder of Burnt Hartshorn with Opium.* Ten grains contain one grain of opium.

PULVIS CRETÆ COMPOSITUS CUM OPIO, Lond. *Compound Powder of Chalk with Opium.* Two scruples contain one grain of opium.

PULVIS IPECACUANHÆ COMPOSITUS, Lond. Dub. *Compound Powder of Ipecacuanha.* Ten grains contain one grain of opium.

PULVIS IPECACUANHÆ ET OPII, Edin. *Powder of Ipecacuanha and Opium.* Each drachm contains six grains of opium, or one grain in ten grains of the powder.

PULVIS KINO COMPOSITUS, Lond. *Compound Powder of Kino.* Each scruple contains one grain of opium.

PULVIS OPIATUS, Edin. *Opiate Powder* contains one grain of opium in ten grains of the powder.

SYRUPUS OPII, Dub. *Syrup of Opium* contains in one fluid ounce about one grain of the watery extract of opium: for the liquor is more than doubled in bulk by the addition of the sugar.

TINCTURA OPII, Lond. *Tincture of Opium.* Nineteen minims contain about one grain of opium.

TINCTURA OPII, Edin. *Tincture of Opium* is made with two scruples of opium in each ounce of liquid, or each drachm should contain five grains. But one drachm of the tincture, when evaporated, yields only three grains and a half of opium.

TINCTURA OPII, Dub. *Tincture of Opium* contains in one fluid drachm about four grains and a half of purified opium.

TINCTURA CAMPHORÆ COMPOSITA, Lond. *Compound Tincture of Camphor.* TINCTURA OPII CAMPHORATA, Edin. Half a fluid ounce contains nearly one grain of opium.

TINCTURA OPII AMMONIATA, Edin. *Ammoniated Tincture of Opium* is made with about eight grains of opium in each ounce of liquid; or each drachm should contain nearly one grain of opium.

TINCTURA OPII CAMPHORATA, Dub. *Camphorated Tincture of Opium.* Four fluid drachms and a half contain nearly one grain of purified opium.

TINCTURA SAPONIS ET OPII, Edin. *Tincture of Soap and Opium* is made with one scruple of opium in each ounce of the liquid.

TROCHISCI GLYCYRRHIZÆ CUM OPIO, Edin. *Troches of Liquorice with Opium.* Each drachm contains nearly one grain of opium.

VINUM OPII, Lond. Dub. *Wine of Opium* contains one ounce of opium in the pint.

IRON.

TINCTURA ACETATIS FERRI CUM ALCOHOLE, Dub. *Tincture of Acetate of Iron with Alcohol.* Each fluid drachm contains about one grain of dry acetate of iron.

ANTIMONY.

VINUM ANTIMONII POTASSIO-TARTRATIS, Lond. *Solution of Tartarized Antimony* contains in each fluid ounce two grains of potassio-tartrate of antimony.

VINUM TARTRATIS ANTIMONII, Edin. *Wine of Tartrate of Antimony* contains in each ounce two grains of tartrate of antimony and potassa.

LIQUOR TARTARI EMETICI, Dub. *Solution of Tartar Emetic* contains two grains of tartrate of antimony and potassa in each ounce.

MERCURY.

EMPLASTRUM HYDRARGYRI, Edin. *Mercurial Plaster.* Each drachm contains about sixteen grains of mercury (fifteen grains, *Lond.*).

HYDRARGYRUM CUM MAGNESIA, Dub. *Mercury with Magnesia.* Five grains contain two of mercury.

HYDRARGYRUM CUM CRETA, Lond. *Mercury with Chalk.* Three grains contain one grain of mercury.

HYDRARGYRUM CUM CRETA, Dub. *Mercury with Chalk.* Five grains contain one of mercury.

LIQUOR HYDRARGYRI BICHLORIDI, Lond. *Solution of Bichloride of Mercury.* Two fluid ounces contain half a grain of bichloride of mercury.

LINIMENTUM HYDRARGYRI, Lond. *Mercurial Liniment.* Six drachms contain one drachm of mercury.

PILULÆ HYDRARGYRI, Lond. Dub. *Mercurial Pills.* Three grains contain one grain of mercury.

PILULÆ HYDRARGYRI, Edin. *Mercurial Pills.* Each drachm contains fifteen grains of mercury. Each five-grain pill contains one and one fourth grain of mercury.

PILULÆ HYDRARGYRI CHLORIDI COMPOSITÆ, Lond. Edin. *Pills of Chloride of Mercury.* About four grains contain one grain of chloride of mercury.

PILULÆ CALOMELANOS COMPOSITÆ, Dub. *Compound Calomel Pills* contain one grain of mercury in five grains.

UNGUENTUM HYDRARGYRI FORTIUS, Lond. Dub. *Stronger Mercurial Ointment.* Two drachms contain one drachm of mercury.[1]

UNGUENTUM HYDRARGYRI MITIUS, Lond. *Weaker Mercurial Ointment.* Six drachms contain one drachm of mercury.

UNGUENTUM HYDRARGYRI MITIUS, Dub. *Milder Mercurial Ointment* contains half a drachm of mercury in two drachms of the ointment.

UNGUENTUM HYDRARGYRI, Edin. *Mercurial Ointment.* Each drachm contains twelve grains of mercury:

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[1] In the simple mercurial ointments, the mercury is probably in the state of an oxide; but in this table the quantity of the metal is given.

made with double the quantity of mercury, each drachm contains twenty grains.

UNGUENTUM NITRATIS HYDRARGYRI FORTIUS, Edin. *Stronger Ointment of Nitrate of Mercury.* Each drachm contains four grains of mercury.

UNGUENTUM NITRATIS HYDRARGYRI MITIUS, Edin. *Milder Ointment of Nitrate of Mercury.* Each scruple contains half a grain of mercury.

UNGUENTUM OXIDI HYDRARGYRI CINEREI, Edin. *Ointment of the Grey Oxide of Mercury.* Each drachm contains fifteen grains of the oxide.

UNGUENTUM OXIDI HYDRARGYRI RUBRI, Edin. *Ointment of Red Oxide of Mercury.* Each drachm contains seven grains of the oxide.

UNGUENTUM HYDRARGYRI NITRICI OXIDI, Dub. *Ointment of Nitric Oxide of Mercury* contains in one drachm six grains and a half of the oxide.

ARSENIC.

LIQUOR POTASSÆ ARSENITIS, Lond. Dub. SOLUTIO ARSENICALIS, Edin. *Arsenical Solution.* One fluid ounce contains four grains of arsenite of potassa.

IODINE.

TINCTURA IODINII, Dub. *Tincture of Iodine* contains five grains of iodine in one fluid drachm.

TABLE
OF
NEW NAMES;

Showing to what Name of the former London Pharmacopœia each belongs.

New Names.	Former Names.
Acacia	Acaciæ Gummi.
Acetum distillatum	Acidum aceticum dilutum.
Acidum arseniosum	Arsenicum album.
——— hydrochloricum	Acidum muriaticum.
Acorus	Calami radix.
Aloe	Aloe spicatæ extractum.
Ammoniæ hydrochloras	Ammoniæ murias.
——— sesquicarbonas	Ammoniæ subcarbonas.
Anthemidis flores	Chamæmelum, *flos simplex.*
Antimonii sesquisulphuretum	Antimonii sulphuretum.
——— oxysulphuretum	Antimonii sulphuretum præcipitatum.
Antimonii Potassio-Tartras	Antimonium tartarizatum.
Armoracia	Armoraciæ radix.
B.	
Bismuthi trisnitras	Bismuthi subnitras.
C.	
Calcii chloridum	Calcis murias.
Canella	Canellæ, *cortex.*
Capsicum	Capsici baccæ.
Caryophyllus	Caryophilli.
Cassia	Cassiæ pulpa.
Ceratum	Ceratum simplex.
Cinchonæ lancifolia	Cinchonæ lancifoliæ cortex.
——— cordifolia	——— cordifoliæ cortex.
Cinchona oblongifolia	Cinchonæ oblongifoliæ cortex.
Cocci	Coccius.
Confectio Amygdalæ	Confectio Amygdalarum.
——— Aurantii	——— Aurantiorum.
——— Scammonii	——— Scammoniæ.
Colocynthis	Cucumis Colocynthis, *pomarum pulpa.*
Cupri ammonio-sulphas	Cuprum ammoniatum.
Cusparia	Cuspariæ cortex.
Cydonia	Cydoniæ semina.

D.

NEW NAMES.	FORMER NAMES.
Decoctum Amyli - -	Mistura Amyli.
——— Cinchonæ cordifoliæ	Decoctum Cinchonæ.
——— Cetrariæ - -	——— Lichenis.
——— Sarsæ - -	——— Sarsaparillæ.
——— Sarzæ compositum -	——— Sarsaparillæ compositum.

E.

NEW NAMES.	FORMER NAMES.
Elaterium - - -	Elaterii Pepones.
Emplastrum Picis - -	Emplastrum Picis compositum.
Extractum Cinchonæ cordifoliæ	Extractum Cinchonæ.

F.

NEW NAMES.	FORMER NAMES.
Ferri Sesquioxydum - -	Ferri Subcarbonas.
—— Ammonio-chloridum -	Ferrum Ammoniatum.
—— Potassio-tartras - -	—— Tartarizatum.

H.

NEW NAMES.	FORMER NAMES.
Hydrargyri Oxydum - -	Hydrargyri Oxydum cinereum.
——— Binoxydum - -	——— Oxydum rubrum.
——— Bichloridum - -	——— Oxymurias.
——— Chloridum - -	——— Submurias.
——— Sulphuretum cum Sulphure - - -	——— Sulphuretum nigrum.
——— Ammonio-chloridum	Hydrargyrum præcipitatum album.

I.

NEW NAMES.	FORMER NAMES.
Infusum Caryophylli - -	Infusum Caryophillorum.

L.

NEW NAMES.	FORMER NAMES.
Linimentum Ammoniæ - -	Linimentum Ammoniæ fortius.
——— Ammoniæ sesquicarbonatis - - -	——— Ammoniæ subcarbonatis.
——— Hydrargyri compositum - - -	——— Hydrargyri.
——— Saponis - -	——— Saponis compositum.
Liquor Ammoniæ sesquicarbonatis - - -	Aqua Ammoniæ subcarbonatis.
—— Potassæ Arsenitis -	Liquor arsenicalis.
—— Calcii chloridi - -	Aqua Calcis muriatis.
—— Cupri ammonio-sulphatis	—— Cupri ammoniaci.
—— Hydrargyri bichloridi -	—— Hydrargyri oxymuriatis.
—— Plumbi diacetatis -	—— Plumbi subacetatis.
—— Potassæ carbonatis -	—— Potassæ subcarbonatis.

M.

NEW NAMES.	FORMER NAMES.
Magnesiæ Carbonas - -	Magnesiæ Subcarbonas.
Mistura Amygdalæ - -	Mistura Amygdalarum.
—— Acaciæ - -	Mucilago Acaciæ.

O.

NEW NAMES.	FORMER NAMES.
Oleum Menthæ Pulegii - -	Oleum Pulegii.
——— Terebinthinæ purificatum.	——— Terebinthinæ rectificatum.
Oxymel - - -	Oxymel simplex.

P.

Pilulæ Hydrargyri Chloridi compositæ - - -	Pilulæ Hydrargyri submuriatis compositæ.
——— Saponis compositæ.	——— Saponis cum Opio.
Plumbi Carbonas - -	Plumbi Subcarbonas.
——— Oxydum - -	——— Oxydum semivitreum.
Potassæ Hydras - -	Potassa fusa.
——— Bicarbonas - -	Potassæ carbonas.
Potassii Sulphuretum - -	——— sulphuretum.
——— Bitartras - -	——— supertartras.
Pulvis Antimonii compositus -	Pulvis antimonialis.

S.

Sodæ Potassio-tartras - -	Soda tartarizata.
—— Biboras - - -	Sodæ Subboras.
—— Carbonas - - -	—— Subcarbonas.
Sodii Chloridum - -	—— Murias.
Spiritus Menthæ Pulegii -	Spiritus Pulegii.
Syrupus - - -	Syrupus simplex.
——— Aurantii - -	——— Aurantiorum.
——— Sarzæ - - -	——— Sarsaparillæ.

T.

Tinctura Ferri Ammonio-chloridi - - -	Tinctura Ferri Ammoniati.
——— Camphoræ - -	Spiritus Camphoræ.
——— Lavandulæ composita	——— Lavandulæ compositus.
——— Ferri sesquichloridi	——— Ferri Muriatis.
——— Rhei - -	——— Rhei composita.
——— Sennæ - -	——— Sennæ composita.

V. & U.

Vinum Antimonii Potassio-tartratis - - -	Vinum Antimonii tartarazati.
Unguentum Elemi - -	Unguentum Elemi compositum.
——— Hydrargyri ammonio-chloridi - -	——— Hydrargyri præcipitati albi.

APPENDIX.

No. I.

OF WATER.

Syn. Aqua (*Lat.*), ὕδωρ (*Greek*), Eau (*F.*), Agua (*S.*), Acqua (*Ital.*), Aae (*Dan.*), A (*Swed.*), Ea, Eha (*old Sax.*), Awe (*Pers.*), Aw (*Welsh*), Aa (*Low Germ., Islandic*), Ab (*Shans.*), Abh (*Gaelic*), Immek (*Esquimaux*), Tannee (*Tam.*), Panic (*Duk.*), Mah (*Arab.*), Watoora (*Cyng.*), Ayer (*Malay*), Panicum (*Sans.*), Hai (*Tonquinese*), A (*Gothic*), Inki (*Bornou*), Mane (*Begharmi*), Gowah (*Mandara*), Hary (*Timbuctoo*).

WATER is an agent of great importance, independent of the part it sustains in the magnificent operations of nature. Its efficacy in the cure of disease is indubitable; yet it is not admitted into the list of materia medica of any of the British Pharmacopœias, either in its ordinary state, or in form of mineral water. Under both of these forms it is necessary that its qualities and effects should be known to the medical practitioner.

I. COMMON WATER.

THE usual appearance of water is too well known to require description. It retains its fluidity under the ordinary pressure of the atmosphere, at any degree of temperature between 32° and 212° [1], Fah.: under 32° it crystallises, becomes solid, and is changed into ice; above 212° [2] it becomes steam, expanding to 1698 times its ordinary bulk. One cubic inch of pure water at 60°, and under a pressure of the atmosphere indicated by 30° of the barometer, weighs 252·42 grains, or nearly $\frac{1}{13}$ part of a grain less than two hundred and fifty-two grains and a half.

Although water is almost universally diffused over the surface of the earth, yet it is not found perfectly pure in any place; which is owing to its great solvent powers enabling it to take up a portion of many things with which it comes into contact in its natural state. These impregnations, however, are not sufficient in general to give it any very sensible taste or odour, or to render it unfit for the ordinary purposes of life; and it is in this state that common water is usually obtained. Common water varies considerably according to the source whence it is derived, and other circumstances; but all the varieties may be reduced under the three following heads: —

1. Rain water — *Aqua pluvialis.*
2. Spring Water — *Aqua fontana.*
3. River Water — *Aqua fluviatilis.*

1. RAIN WATER is the purest kind of natural water; nevertheless, in every 100 cubic inches, it contains in solution about $3\frac{1}{2}$ cubic inches of air, rather more oxygenous than common atmospherical air, and about one cubic inch of carbonic acid gas, besides minute portions of carbonate of lime and sulphate of lime. Its specific gravity scarcely differs from that of distilled water; it is sufficiently pure for most pharmaceutical purposes.[3] When rain water, however, is collected in towns, or from the roofs of houses, besides the small portion of sulphate of lime, it contains soot and other impurities, and requires to be boiled and filtered.

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[1] This degree varies according to the pressure of the atmosphere. Thus, in Gemmilaro's hut, on the side of Etna, about 11,332 feet from the level of the sea, Dr. Irvine found that water boiled at 191°. Vide *Letters on Sicily*, 8vo. p. 153.

[2] Gay Lussac.

[3] Morveau, *Annales de Chimie*, xxiv. 320.

Snow Water, when newly melted, is destitute of air, which is the reason that fish cannot live in it; but when allowed to remain for some time exposed to the atmosphere, it does not differ in its qualities from rain water.

2. SPRING WATER, if it have not filtered through a very soluble soil, is almost as pure as rain water. The best springs are those which rise through sand or gravel at a small depth.[1] It generally contains, besides the ingredients which are found in rain water, a small portion of chloride of sodium.

Well or Pump Water, which is spring water obtained by digging to a considerable depth, is by no means so pure. It is commonly distinguished by a property named hardness, implying an incapability of dissolving soap[2], which is owing to its containing many earthy salts, the principal of which is sulphate of lime. It also contains more carbonic acid gas than common spring water. Many of the foreign ingredients contained in hard water are simply suspended in it; for pump water is rendered softer and purer by only passing it through a filtering stone. The best mode of freeing hard water of its earthy salts, is first to boil it; then, after it has cooled, to drop into it an alkaline carbonate; and, lastly, to filter it. It cannot be employed for pharmaceutical purposes.

3. RIVER WATER, when the stream is rapid, and runs over a pebbly channel, is as pure as soft spring water; but when the current is slow, and the bed clayey, it approaches nearer to the nature of well water, and frequently contains putrefied vegetable and animal matters, as is generally the case in the water of lakes.

Such are the foreign ingredients contained in *common water:* distillation in glass vessels frees it entirely from these ingredients, and it is obtained almost perfectly pure, transparent, colourless, insipid, and inodorous.

The varieties of waters enumerated above may be almost indiscriminately employed as diluents, the small proportion of foreign ingredients they contain occasioning no difference in their diluent properties. When the quantity of sulphate of lime and aluminous matter, however, is very considerable, as is the case in the water of many pumps, there is some reason for concluding that deleterious effects may arise from the use of the water; although it may be doubted whether the scrofulous and glandular swellings, peculiar to some populous towns, can be justly ascribed to this cause.[3] Even a few of the waters which are regarded as mineral waters owe more to the diluent property of the water for their efficacy than to the impregnations they contain. This is particularly the case with the Malvern spring, which has been found to contain very little foreign matter. The diluting power of water is much modified by temperature; warm or tepid water being a much better diluent than cold water.

The medicinal properties of water as a diluent were well known to the ancients; and cold water, used as a drink in fevers, was the principal remedy of the father of physic in these complaints. The temperature of 60° is the proper degree, when it is intended that water should produce its diluent effects without the aid of heat. Under 45° it produces a sedative and astringent effect; above 60° and under 100°, it relaxes the fibres of the stomach, and is apt to induce nausea, particularly when bulk is added to this range of temperature; but at a higher temperature, the stimulus of heat, in the same manner as the addition of other stimulants, prevents that effect. Simple water may supersede the use of all other diluents; but animal and vegetable infusions are generally employed; or toast and water (*infusum panis tosti*), which is more agreeable to most palates, and is an excellent diluent in fevers and inflammatory diseases. The temperature of water as a diluent should be regulated by the nature of the disease; in internal hæmorrhages the temperature should not exceed 45°, but it may be 60° in fevers; unless in the

[1] The water conveyed to Hoddesdon, in Hertfordshire, rises through a fine white sand, and is so pure, that Dr. Hales affirms it left no incrustation in a boiler which had been in constant use for fifteen years. *Statistical Essays*, ii. 242.

[2] Soap when agitated with hard water is decomposed; the alkali of the soap uniting with the acid of the earthy salts, while the oil and earths combine, and form new, nearly insoluble soaps, which swim in a curdy form on the surface of the water.

[3] Percival ascribes the glandular swellings common in Manchester to this cause. See *Essays*, i. 291.

cold stage of the paroxysm of fever, when thirst should be allayed by tepid, or warm water, or other bland fluids; and the same precaution is necessary when the sweat has become general and profuse. In cases in which there exists a morbid increase of bile, disturbing the functions of the stomach and irritating the bowels, the temperature of the water used as drink may be from 90° to 114°; and in some cases of dyspepsia, which are attended with the sensation of coldness at the stomach, and with cold extremities, a cupful of water, taken as hot as it can be drunk, affords very considerable relief. In cases of redundant bile, by drinking half a pint of tepid water every morning before breakfast, and taking immediately afterwards moderate exercise, the acrid bile is diluted, and its passage through the bowels assisted, without the irritation which, in its undiluted state, it always excites; and it produces the same benefit in cholera morbus in the commencement of the disease, the stomach being rendered by it more fit to receive opiates and other remedies. Some medecines, as sudorifics, diuretics, and emetics, scarcely produce their effects, unless their operation be assisted by copious dilution with water, or watery fluids.

Water is also an external remedy of great importance, but its effects are much modified by the degree of temperature at which it is applied.

COLD WATER, or of a temperature under 70°, gives the sensation of cold to the skin, and is applied under the form of *bath* and of *affusion*.

The cold bath (*balneum frigidum*) is water of any temperature, from 42° to 85° of Fahrenheit. When the body is immersed in it, it first induces the sensation of cold, excites shivering, renders the skin pale, and contracts it so as to produce the appearance denominated goose skin (*cutis anserina*); the respiration at the same time is quickened, rendered irregular, and sobbing occurs. The pulse is diminished in force and velocity, but is rendered firmer and more regular. If the immersion be not long continued, reaction takes place on coming out of the bath; a glow, or agreeable sensation, of heat is felt over the whole body, the tone and vigour of the muscles are increased, a buoyancy of spirit and aptitude for action succeed, and a sense of general refreshment is experienced by the bather. The protraction, however, of the immersion for a considerable space of time, particularly if the temperature of the bath be under 50°, is not followed by this reaction, but the cold water operates as a powerful sedative; the action of the heart and arteries becomes languid, the pulse ceases at the wrist, the animal heat is rapidly diminished, and a sensation of coldness at the stomach is felt, which is succeeded by faintness, delirium, torpor, and sometimes death. These unpleasant effects are occasionally experienced in some degree, even when the immersion is not protracted, and the temperature of the bath is not under 60°; in which case cold bathing proves always hurtful, and ought not to be repeated: but when the contrary effects are experienced, it is found to be useful in many diseases of debility, particularly in scrofula, if the water be impregnated with salt, or sea-bathing be resorted to. The debilitated, however, in whom the use of sea-bathing produces these effects, when it is employed before breakfast, are not always affected in the same manner when it is used after breakfast, or when the stomach is full; but, on the contrary, they receive the same benefit from it as those with whom it agrees at all times. The use of cold water as a general bath is never employed with a view of producing its sedative effects; but for this purpose it is partially applied, either by the immersion of the affected parts, or by means of cloths dipped in very cold water, and laid over or near the parts. It is used as a remedy in active uterine hæmorrhages, burns, and scalds, and in local inflammations, even when arising from general disease, as gout and acute rheumatism, when the surface of the pained part appears red and inflamed; and in inflammation of the brain or its membrane, in which case it is either applied to the shaved scalp, or dropped upon the vertex.

The cold affusion, or the suddenly pouring cold water over the whole surface of the body, operates as a powerful remedy, although its effects as such are of short duration. They are produced by the suddenness of the application affecting the nervous energy, and by the shock rousing the dormant sensibility, so as to induce a new action, as it were, of the nervous system, carrying off a large portion of morbid heat by general evaporation, and exciting insensible perspiration; thence restoring the healthy action of the exhalants and the capillaries. In typhus fever this mode of applying cold water has been productive of the best effects.[1] It should be resorted to in the first hot stage of the disease, if possible, and repeated every time the morbid heat returns. If the water can be impregnated with salt, so much the better; but when the disease is advanced, its temperature should not be more than 26°[2] under that of the body. It often suddenly arrests the disease, if it be used during the three first days, or so late even as the fifth; but after this period it can be regarded as a useful auxiliary only, even when properly employed. In tetanus, Currie affirms[3] that the cold affusion also proves useful, particularly when the shock is considerable, and applied during the convulsions. It is, however, in idiopathic tetanus only that it proves beneficial, no advantage being obtained from using it in tetanus arising from wounds.[4] Its utility has also been proved in many of the exanthemata: for instance, during the hot stage of the eruptive fever of small-pox; and we can bear ample testimony to its efficacy in scarlatina maligna, when the heat rises to above 100°.[5] This remedy, however, is productive of much mischief when misapplied; and therefore it is necessary to observe, that it is contra-indicated in the cold stage of fevers, and when a sense of chilliness is present, although the thermometer indicate the real heat to be more than natural. It may prove injurious, also, when the patient displays much dread of the affusion. It is also said to be improper in fevers, when diarrhœa or dysentery is present; after the sweating stage in intermittents is formed; after the eruption is completely formed in confluent small-pox; and in symptomatic fever occasioned by great local inflammation. Dr. A. Nicoll found it useful in India, in remittent and intermittent fevers, accompanied with *dysentery;* when the heat of the surface exceeded 98° Fahrenheit; for as in these cases the dysenteric symptoms seem to depend on the degree of febrile excitement, the cold water, by producing a solution of these, allays the griping and tenesmus, and natural stools follow. The affusion should always, in such cases, be preceded by bleeding and other depletory means.[6] The water should be dashed from a moderate height; and its temperature should be nearly that of the air at the time. The cold affusion, in the form of the shower-bath, is advantageously employed as a stimulant and tonic in diseases of general debility. I know of no remedy so generally useful in those affections which are known by the name of nervous complaints.

WARM WATER, or of a temperature from 86° to 100°, gives the sensation of warmth to the body, and is applied both locally and generally, in the form of vapour, fomentation, and bath. Water is found in a state of nature combined with different quantities of caloric within the above range of temperature. In the Buxton hot springs the temperature is about 82°; at Bristol it is from 74° to 84°; and at Bath the range is from 110° to 114°.[7] The necessary degree of temperature, however, is generally obtained by artificially heating the water.

The general application of warm water is by means of baths. When the greater part of the entire body is immersed, the water constitutes properly a bath (*balneum*); but when half only is immersed, it is a half bath (*semicupium*). The bath may be either,

a. The hot bath (*balneum calidum*), from 97° to 106°.
b. The tepid bath (*balneum tepidum*), from 86° to 96°.
c. The vapour bath (*balneum vaporis*), from 109° to 130°.

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1 The cold affusion was employed by Antonius Musa, physician to Augustus, when that emperor was affected with a bowel complaint, which had resisted every other remedy. *Vide Q. Horatii F. Epistol. ad Num. Valam. C. Sueton. Tranq. Octavius Aug.* ii. cap. 81. p. 104. Cold affusions in the fevers of Asia are also prescribed by the Koran, and used in India by the Mahometan and Hindoo physicians in various diseases.

2 Currie, *Reports on Cold Water*, i. 31. 3 *Ibid.* i. 138. 4 *Ibid.* i. 159.

5 Currie gives the following results of the affusion:—The heat of the body in fever, as indicated by the thermometer, being 103°, was by it reduced to 98°, in half an hour; and the pulse from 112 to 80 beats (vol. i. 22.); the heat 101° was reduced to 99°; and the pulse from 112 to 98 in the same time. The heat 106° was reduced to 98°; and the pulse from 130 to 90 (vol. i. 46.).

6 *Lond. Med. Repository*, vol. ix. p. 123.

7 The temperature of the Cross Bath pump is 110°; the King's Bath 112°; and the Hot Bath 114°.

The two first differ in temperature only; but the last, from the water being applied in a very minutely divided state, acts with much greater effect than water in the liquid form. The operation of the first of these forms of applying water is stimulant; it augments the action of the heart and arteries, renders the skin red, quickens respiration, and produces a copious flow of sweat. It also increases the bulk of the body. But the others, although they excite the sensation of heat, yet lessen the frequency of the pulse, relax powerfully the skin and simple solids, and diminish generally increased excitement.

Warm and vapour baths [1] are efficaciously employed in acute rheumatism, inflammation of the abdominal viscera, of the kidneys, bladder, and uterus; in suppression of urine, and in spasmodic affections, particularly those to which infants are liable, arising from dentition and other irritations. The general relaxation produced by their use has been taken advantage of, also, for assisting the reduction of strangulated hernia; for, although the effect be not topical as it regards the hernial tumour, yet the general relaxation produced gives a disposition to all the parts to regain their proper place. The tepid bath is found to be very useful in the rigidities which follow some acute diseases, as gout and rheumatism, nodosities of the joints [2], and, according to some, the rigidities attendant on old age.[3] Its effects in promoting the natural excretions by the skin render it very serviceable in promoting the cure of herpetic eruptions; in slight cases of lepra the use of it with friction is all that is required; and in all cutaneous foulnesses it is a most important auxiliary. It has also been found very beneficial in cases of insanity. In general the period of immersion should not be less than twenty minutes, nor exceed one hour.[4]

The partial application of warm water as a remedy is made by means of

1. *a.* The foot bath (*pediluvium*);
   b. The hip bath (*coxæluvium*); and
   c. The hand bath (*manuluvium*).
2. *d.* Fomentations of vegetable decoctions; and
   e. Flannel cloths wrung out of boiling water, by which the moisture is applied in a state of vapour.

These partial baths are useful in the same diseases for which the general baths are employed; but are better adapted for relieving the rigidity of single joints and topical inflammation; and the hip bath has lately been found to be very beneficial in suppressed menstruation, and for relieving the pains of cancer in utero.

For fomentations it is the practice to employ vegetable decoctions; but the best

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[1] A very simple and convenient vapour bath for military practice was recommended by my friend, Dr. A. Nicoll. It may be formed of a common beer or spirit barrel, with a false bottom, placed about a foot from the bottom of the cask, and perforated with numerous small holes. A gun barrel connected with the spout of a tea-kettle placed on a fire is to be introduced into an opening in the side of the cask between the real and false bottom; and the patient being seated on the false bottom, the steam or vapour from the boiling kettle soon surrounds him by rising through the holes. It must be prevented from escaping by means of a blanket, which should cover the open end of the cask, and apply closely round the neck of the patient.

A still more simple vapour bath is formed by placing a bucket of boiling water close to a chair on which the patient is seated, and surrounding both the bucket and the patient with a blanket pinned round the throat of the latter. A hot brick thrown into the water renews the extrication of the vapour.

[2] Haygarth, *Clinical History of Diseases*, 8vo. Lond. 1805.

[3] Tepid bathing with friction is said by one author, "vitam sæpe per plures menses, interdum etiam per aliquot annos, protraxisse." — Gregory, *Conspectus Med.* ii. 100.

[4] The Arabian physicians used the vapour bath in a singular mode, in scrofulous affections, which they denominated Bother: — "ponatur sub puero olla plena aquâ calidâ, in principio apparitionis pustularum, ut attrahat ab interioribus superfluum humorem ad corporis superficiem."—*Rhazes de Morbis Infant.* cap. 19. by Willan, p. 31.

of these can be regarded only as vehicles for retaining the heat and moisture. At all times, flannel cloths wrung out of boiling water are superior; both because the water is applied in the form of vapour, and also, while they continue as long warm, they do not wet the bed and linen of the patient. The flannel cloths should be each about two yards long, with the ends sewed together, so that by means of two sticks, one being at each end, turned in opposite directions, they may be wrung much dryer, when taken out of the boiling water, than could be effected by the hands. The principal circumstance to be attended to in the application of fomentations is the frequent renewal of them, in order that a steady and constant heat may be applied to the fomented part.

No. II.

MINERAL WATERS.

It has been already noticed, that although no natural water is found in a state of absolute purity, yet that in general the quantity of foreign matters is not sufficient to give any very sensible taste or odour. In some instances, however, the foreign matter is so considerable, and of such a nature, as to prevent the water from forming a part of the nourishment of animals; in which case it is denominated a Mineral Water, and can be useful to mankind only in a medicinal point of view.

Mineral waters may be arranged into the five following classes: — 1. Acidulous Waters; 2. Alkaline Waters; 3. Chalybeate Waters; 4 Sulphureous Waters; 5. Saline Waters. I shall first give a sketch of the physical characters and medicinal properties of each of these classes; and then describe the method of determining the ingredients, and their proportions, contained in any mineral water.

1. Acidulous Waters owe their properties chiefly to carbonic acid. They sparkle when drawn from the spring, or when poured into a glass; have an acidulous taste, and become vapid when exposed to the air. Besides free carbonic acid, on the presence of which these qualities depend, acidulous waters contain generally also carbonates of soda, bicarbonates of lime, of magnesia, and of iron.

They mav be divided into *thermal*, or *warm acidulous waters*, and *cold acidulous waters;* the temperature of the former, however, does not exceed 72°, while that of the latter is generally about 55°.

Of this kind are the springs of Cleves in Germany; Granshaw in Ireland; Languac, Upper Loire; Orston and Thorston, Nottinghamshire; Passi, near Paris; Stonefield, Lincolnshire; Tonstein in Germany; Wisbaden in Nassau; and Bandola in Italy; but the most celebrated springs of this class are Pyrmont, Seltzer, Spa, and Carlsbad. They are tonic and diuretic; and in large doses produce a sensible degree of exhilaration. They all afford a grateful and moderate stimulus to the stomach; but the Pyrmont and Spa, containing carbonate of iron, are especially useful in all cases of impaired digestion; while those which contain alkaline carbonates, as the Carlsbad and Seltzer, are more particularly employed as palliatives in calculous affections.

2. Alkaline Waters owe their properties to a free alkali or one very slightly carbonated. They display an alkaline reaction. Alkaline springs are not very numerous.

3. Chalybeate Waters owe their properties to iron, in combination generally with carbonic acid; and as this is usually in excess, they are often acidulous as well as chalybeate. The metal is found also in the form of a sulphate, but the instances of this are very rare.

Chalybeate waters have a styptic or inky taste; they are, when newly drawn, transparent, and strike a black with tincture of nut-galls; but an ochry sediment, a hydrated peroxide of iron, soon falls, and the water loses its taste. If the iron be in the state of sulphate and hydrochlorate, however, no sediment falls; and the black colour is produced by the above test, even after the water has been boiled and filtered. Chalybeate springs are very numerous. On the Continent are those of Abcourt, St. Germain; Aumale and Forges, near Rouen; Bologne;

Buzot, in Spain (*a warm spring*); Caroline baths, Bohemia; Daswild, Baden, Germany; Driburgin, Westphalia; Naptha, in Russia; Nisdeniee, in Germany; Swalbach, in Nassau, Ponges, Hassenfratz; Perekop, Russia; Sarepta, Russia; Scolliensis, Switzerland; Suchalda, Hungary; and Vechy, near Moulins. There are many chalybeates in Great Britain; as, for instance, those of Arbroath and Peterhead in Scotland; Ashton, in Wiltshire; Balemore, Worcestershire; Ballycastle, Antrim; Ballynahinch, Down; Ballyspellan, Kilkenny; Bandon, Cork; Bromley, Kent; Brownstown, Kilkenny; Castlecomer, Kilkenny; Castleconnel, Limerick; Castlemain, Kerry; Coalcullen, Kilkenny; Corville, Tipperary; Coventry; Crosstown, Waterford; Doneraile, Cork; Dunnard, Dublin; Galway; Garry-hill, Carlow; Haigh, Lancashire; Hampstead; Hartfell, Scotland; Islington; Kilcoran, Clare; Kilagee, Down; Kirby, Westmoreland; Lancaster; Llandridad, Wales; Luz, Essex; Listerlin, Kilkenny; Milltown, Mallay, Clare; Newton Stewart, Tyrone; Oakfield, Cavan; Phœnix Park, Dublin; Scool, Clare; Shadwell, near London; Somersham, Huntingdonshire; and many others: but the most celebrated are Tunbridge, Brighton, and Peterhead; the Cheltenham spring also contains carbonate of iron; but on account of the large proportion of saline matter, and its strong purgative properties, it is not ranked in this class. The Spa springs also belong to this class.

Chalybeate waters are powerful tonics, and are employed in dyspepsia, scrofulous affections, cancer, amenorrhœa, chlorosis, and the other diseases of debility for which the artificial preparations of iron are used. Much of the benefit derived from the use of chalybeate waters depends on the extreme division of the metallic salts they contain, as well as the vehicle in which it is held in solution; while at the same time their operation is much modified by the carbonic acid by which the iron is suspended. When the water is a carbonated chalybeate, it should be drunk the moment it is drawn from the spring; but the same precaution is not necessary with a water containing sulphate of iron.

4. SULPHUREOUS WATERS derive their character chiefly from sulphuretted hydrogen gas; which in some of them is uncombined, while in others it is united with lime or an alkali. They are transparent when newly drawn from the spring, and have the fœtid odour of rotten eggs, which is gradually lost by exposure to the air, and the water becomes turbid. When they are strongly impregnated with the gas, they redden infusion of litmus; and, even in a weak state, they blacken silver and lead. Besides containing sulphuretted hydrogen gas, they are not unfrequently, also, impregnated with carbonic acid. They generally contain chloride of magnesium or other saline matters, which modify their powers as a remedy.

The most important sulphureous springs in this island are those of Kilburn, Harrowgate, and Moffat; but the following are also of some note: Annaduff, Leitrim; Askeron in Yorkshire; Broughton in Yorkshire; Clonmel, Tipperary; Codsalwood, Staffordshire; Derrylister, Cavan; Drumasnane, Leitrim; Dudley, Worcestershire; Kedlistone, Derbyshire; Killashen, Fermanagh; Loansbury, Yorkshire; Maudley, Lancashire; Nottington, Dorsetshire; Ripon, Yorkshire; Shapmoor, Westmoreland; Wardrew, Northumberland; and Wirksworth in Derbyshire. On the Continent, Aix-la-Chapelle; Barége; Baden; Baia, Italy; Dux, Bayonne; Ems, Germany; Montmorency, near Paris; Motte, near Grenoble; Viterbo in Italy; and St. Amands, near Valenciennes; which are resorted to chiefly for the cure of cutaneous eruptions, and are applied locally as well as drunk. They are slightly sudorific and diuretic, andare apt to occasion in some patients headach of short duration, directly after they are drunk. They are also employed for curing visceral and scrofulous obstructions, torpor of the intestines, and some dyspeptic and hypochondriacal cases.

5. SALINE MINERAL WATERS owe their properties altogether to saline compounds. Those which predominate, and give their character to the waters of this class, are either,

1. Salts, the basis of which is lime;
2. Chlorides of sodium and magnesium;
3. Sulphate of magnesia;
4. Alkaline carbonates; particularly carbonate of soda.

They are mostly purgative, the powers of the salts they contain being very much increased by the large proportion of water in which they are exhibited. The most celebrated saline springs are those of Cheltenham, Leamington, Bristol, Kinalton, Pancras near London, Scarborough, Sydenham, and Thursk in Yorkshire, in England; Pitcaithly, in Scotland; and Seidlitz on the Continent. They are employed in diseases which require continued and moderate intestinal evacuations; such as dyspepsia, hypochondriasis, chronic hepatitis, jaundice, and strumous swellings. They are more grateful to the stomach when carbonic acid also is present; and when they contain iron, as in the case of the Cheltenham spring, their tonic powers, combined with their purgative qualities, render them still more useful in dyspeptic complaints and amenorrhœa.

To this class the water of the ocean belongs. The quantity of saline matter SEA WATER contains varies in different latitudes; thus, between 10° and 20° it is rather more than $\frac{1}{24}$th; at the equator it is $\frac{1}{25}$th; and at 57° north it is only $\frac{1}{27}$th. The saline ingredients, in 10·000 parts of sea-water, according to the last analysis of Dr. Murray[1], are, chloride of sodium, 220·01; chloride of calcium, 7·84; chloride of magnesium, 42·08; and sulphate of soda, 33·16. When brought up from a great depth, its taste is purely saline; but when taken from the surface it is disagreeably bitter, owing, perhaps, to the animal and vegetable matters suspended in it. Its specific gravity varies from 1·0269 to 1·0285; and it does not freeze until cooled down to 28·5° Fahrenheit. Its medicinal properties are the same as those of the saline purging waters, but more powerful; and as a bath, its efficacy is much superior to that of fresh water.

The general effects of mineral waters are modified by temperature, whether they be taken internally, or be externally applied. In some springs, as those of Bath, Matlock, Buxton, Wildbad in Germany, Bagnols in France, Bonnes in the Lower Pyrenees, Borset near Aix-la-Chapelle, Canteries in the Upper Pyrenees, Digne in the Lower Alps, Klintschysela in Russia, Lucca in Italy, Plombieres in Lorraine, and Pontgibault in France[2]: their virtues depend almost altogether on temperature; and in others, as Malvern, which has been found to contain scarcely any foreign matter, the simple diluent power of the pure water seems to produce the benefit that results from drinking them. Some of the good effects of all of them, however, must be allowed to proceed from change of scene, relaxation from business, amusement, temperance, and regular hours; and in these circumstances, the drinking the waters at the springs possesses advantages which cannot be obtained from artificial waters, however excellent the imitations may be; nor even from the natural waters, when bottled and conveyed to a distance from the springs.

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[1] *Edinburgh Transactions*, vol. viii. p. 205. The water was taken from the Frith of Forth, and was of the specific gravity 1·029.

[2] See, for a very full table of mineral waters, *Dr. Ryan's Essay on the Nat. Hist. of Water; Med. and Phys. Journ.* vol. liv. pp. 452—461.

See for a very full table of mineral waters Dr Ryans Essay on the Nat. Hist. of Water Med Phys Journ

Table of the more celebrated Mineral Waters, showing the Ingredients contained in each Water.

	Names of the Springs.	Quantity of water.	Gases.				Carbonates of				Sulphates of				Chlorides of				Silica.	Ammonia.	Resin.	Temperature.
			Oxygen.	Carb. acid.	Sulp. Hydr.	Nitrogen.	Soda.	Lime.	Magnesia.	Iron.	Soda.	Lime.	Magnesia.	Iron.	Soda.	Lime.	Magnesia.	Potash.				
		grains.	cubic in.	cubic in.	cubic in.	cubic in.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grs.	grains.	grains.	grains.	grs.	grains.	grains.	grs.	
Acidulous.	Seltzer	8949	·435	13·068	—	—	5·22	78·3	6·32	—	—	—	—	—	13·74	—	—	—	—	—	—	cold
	Pyrmont	8950	—	19·6	—	—	—	4·3	9·8	0·70	—	8·38	5·44	—	1·7	—	—	—	—	—	—	cold
	Spa	8933	—	9·8	—	—	1·85	1·85	4·35	0·70	—	—	—	—	0·21	—	—	—	—	—	—	cold
	Carlsbad	25320	—	50·	—	—	38·5	12·5	—	0·1¼	66·75	—	—	—	32·5	—	—	—	2·25	—	—	165°
	Kilburn	138240	—	84·	36·	—	—	2·4	1·25	0·3	18·2	13·0	91·0	—	6·0	0·6	2·8	—	—	—	6·	cold
	Ponges	7291	—	30·	—	—	10·	12·	1·2	2·5	—	—	—	—	2·5	—	—	—	0·5	—	—	cold
	St. Parize	7291	—	22·	—	—	—	11·5	0·5	—	—	13·	—	—	—	—	—	—	—	—	—	cold
	Ems	7291	—	51·	—	—	10·75	1·14	0·8	0·026	6·	—	—	—	7·634	—	—	0·04	60·4	—	—	117°
	Marienbad	7291	—	125·	—	—	8·26	4·13	3·05	0·176	39·72	—	—	—	12·45	—	—	—	0·88	0·75	—	cold
	Anschowitz	7291	—	149·56	—	—	6·197	4·016	2·4	0·4	22·544	—	—	—	8·996	—	—	—	0·669	—	—	cold
	Eger	7291	—	154·	—	—	5·00	—	0·600	0·350	25·50	—	—	—	7·96	—	—	—	0·558	—	—	cold
	Geilnau	7291	—	163·3	—	—	6·62	2·97	2·170	—	0·042	—	—	—	0·543	—	—	—	0·26	0·247	—	cold
Sulphureous.	Harrowgate	103643	—	8·	19·	7·	—	18·5	5·5	—	—	—	0·5	—	615·5	3·	9·1	—	—	—	—	cold
	Moffat	103643	—	1·	10·	4·	—	—	—	—	—	—	—	—	3·6	—	—	—	—	—	—	cold
	Aix-la-Chapelle	8940	—	—	13·06	—	—	15·25	5·89	—	—	—	—	—	6·21	—	—	—	—	—	—	143°
	Enghien	92160	—	18·5	70·	—	—	21·4	1·35	—	—	33·3	5·8	—	2·4	—	8·0	—	—	—	—	cold
	Cheltenham Sulphur Spring	7291	—	—	1·5	—	—	—	—	0·3	23·5	1·2	5·	—	35·	—	—	—	—	—	—	cold
Saline.	Seidlitz	58309	—	8·	—	—	—	6·7	21·	—	—	41·1	14·44	—	—	—	36·5	—	—	—	—	cold
	Cheltenham	103643	—	30·3	3·	12·	—	—	12·5	5·	48·0	40·	—	—	5·	—	12·5	—	—	—	—	cold
	Plombieres	—	—	—	—	—	4·4	1·	—	—	4·7	—	—	—	0·5	—	—	—	2·6	—	—	cold
	Leamington	5760	—	—	—	—	—	—	—	—	7·83	—	—	—	53·75	28·64	20·16	—	—	—	—	cold
	Bristol	7291	—	3·5	—	—	—	1·5	—	—	—	1·5	1·5	—	0·5	—	1·	—	—	—	—	74°
	Scarborough	7291	—	—	—	—	—	—	—	—	—	20·	9·	—	—	—	—	—	—	—	—	cold
	Banege	7291	—	—	—	—	2·5	—	—	—	—	—	—	—	0·5	—	—	—	—	—	—	120°
Chalybeate.	Tunbridge	103643	1·4	10·6	—	4·	—	—	—	1·	—	1·25	—	—	0·5	—	2·25	—	—	—	—	cold
	Toplitz	22516	—	—	—	—	13·5	16·5	—	32·5	—	—	—	—	61·3	28·5	—	—	—	15·1	—	cold
	Brighton	7291	—	2·2	—	—	—	—	—	1·4	—	4·	—	—	3·	—	0·75	0·14	—	—	—	cold
Calcareous, nearly pure.	Bath	15360	—	2·4	—	—	—	1·6	—	·004	3·	18·	—	—	6·6	—	—	—	0·4	—	—	114°
	Buxton	58309	—	—	—	2·	—	10·5	—	—	—	2·5	—	—	1·5	—	—	—	—	—	—	82°
	Matlock	58309	—	—	—	—	—	—	—	—	—	min.	—	—	—	—	—	—	—	—	—	96°
	Malvern	58309	—	—	—	—	—	—	—	—	—	por.	—	—	—	—	—	—	—	—	—	cold

Such are the known contents of the most celebrated mineral waters. Many more have been analysed, but it is unnecessary to introduce an account of them in this place; and I consider it to be of more importance to describe the method of determining the nature and proportion of the substances, or the analysis of mineral waters, one of the most difficult parts of practical chemistry.

METHOD OF ANALYSING MINERAL WATERS.[1]

The first circumstance to be attended to in the chymical examination of any mineral water, is to determine the gross weight of the substances held in solution. This is to be done by first ascertaining the specific gravity of the mineral water; then substracting from it the specific gravity of distilled water (both expressed in whole numbers), multiplying the remainder by 1·4. The product is the gross saline contents, in a quantity of the water denoted by the number employed to indicate the specific gravity of distilled water.[2] Thus, if the specific gravity of the mineral water be 1·079, as that of distilled water is 1·000, the remainder, after the subtraction of the latter from the former, in whole numbers, will be 79, which multiplied by 14 makes 1106; and, therefore, 110·6 is the sum of the saline contents of 1000 parts of the water; or 11·06 are contained in 100 parts. The next step is to ascertain the nature and the proportion of each ingredient.

1. The Aerial or Gaseous Bodies are to be first separated by boiling for a quarter of an hour as much of the water as will fill two thirds of a glass retort, connected with an inverted jar, divided into cubic inches and tenths, full of mercury, and placed in a mercurial trough. The air and gases will pass over into the jar, and depress the mercury; and when cool, after subtracting the air of the retort, the quantity of air expelled from the water may be easily determined.

The only gaseous bodies contained in water are atmospheric air, oxygen gas, nitrogen gas, carbonic acid gas, sulphuretted hydrogen gas, and sulphurous acid; of which the following cannot exist together in the same water: —

Oxygen gas and sulphuretted hydrogen gas,
Sulphuretted hydrogen gas and sulphurous acid.

a. *Sulphuretted hydrogen gas* is known to be contained in water by its peculiar odour, by the water becoming turbid when exposed to the air, and depositing sulphur, by its reddening litmus fugaciously, blackening paper dipped in a solution of lead, and precipitating nitrate of silver black or brown. It may be separated from the air obtained from water during boiling, by carrying the jar into a tub of warm water, and introducing nitric acid, which absorbs the sulphuretted hydrogen. The bulk of this gas contained in any water is determined by filling a jar three fourths with the water, inverting it in a water trough, and introducing nitrous gas at intervals, as long as red fumes appear, or the hepatic odour continues; when the jar is turned up and the air blown out. The nitrous gas in this operation mixing with the common air in the upper part of the jar forms nitrous acid, which renders the water turbid, by decomposing the sulphuretted hydrogen and precipitating sulphur. The bulk of hepatic gas is determined by the weight of the sulphur thrown down, one grain indicating the presence of 3·33 cubic inches of the gas.

b. *Sulphurous acid gas* is ascertained by the same tests which detect the presence of sulphuric acid and water (*which see*).

c. *Carbonic acid gas* is detected by lime-water occasioning a precipitate soluble with effervescence in hydrochloric acid; by reddening fugaciously tincture of litmus, and losing this property when boiled.

To estimate the bulk of these gases, introduce into the air obtained by boiling the water a solution of pure potassa, and agitate the whole gently. These acid gases will be absorbed, and any other gases left; after which, the bulk of the residuum must be estimated, and subtracted from the bulk of the whole to obtain that of the acid gases absorbed. Evaporate next the potassa slowly, nearly to dryness: and by leaving it exposed to the atmosphere, sul-

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[1] The following observations on this important subject are chiefly extracted from the System of Chymistry of Dr. Thompson.

[2] This useful formula was invented by Mr. Kirwan. See *Essay on Mineral Waters*, 145.

phate of potassa will be formed, which may be separated by dissolving the potassa in diluted hydrochloric acid, and filtering the solution. 100 grains of sulphate of potassa indicate 42·72 cubic inches of sulphurous acid gas, which being subtracted from the bulk of the gas absorbed by the potassa, leaves the bulk of the carbonic acid gas.

d. *Oxygen gas*, after the above gases are separated, may be examined by means of the solution of sulphate of iron saturated with nitrous gas.[1] A small graduated tube filled with the air to be examined is to be plunged into this solution, and moved backwards and forwards for a few minutes. The whole of the oxygen is rapidly absorbed; and by marking the greatest absorption, its bulk in a given quantity of the air is ascertained.

e. *Nitrogen gas* is detected by not being affected by eudiometrical processes.

2. ALKALIES, and ALKALINE, EARTHY, and METALLIC CARBONATES. Alkalies, even in minute quantities, are discovered in water by rendering infusion of turmeric, or paper stained with it, brown.[2] When the change is permanent, the fixed alkalies may be supposed to be present; when fugacious, the alkali is ammonia. An infusion of Brazil-wood is rendered blue by the alkalies; but this also is the case with the alkaline and earthy carbonates[3], and the addition of sulphuric acid produces effervescence. Tincture of nutgalls discovers iron; the colour is violet if alkaline carbonates or earthy salts be also present; dark purple indicates other alkaline salts; purplish red, sulphuretted hydrogen gas; and whitish and then black, sulphate of lime. Boiling the water precipitates the earthy and metallic carbonates.

The following substances of this class, set down in the first column, are incompatible, or cannot exist in mineral waters, with the salts placed in the opposite column: —

Alkalies - - - - -	Fixed alkaline sulphates. Alum. Sulphate of magnesia, ——— of iron.
Alkaline carbonates - -	Chloride of barium. ——— of calcium. ——— of magnesium. Nitrate of lime.
Earthy carbonates - -	Sulphate of iron. Chloride of barium.
Carbonate of magnesia	Sulphate of lime. Alum. Chloride of calcium.

a. *Alkalies and their carbonates* are detected in mineral waters by the tests already mentioned; and by the water, after being boiled, throwing down a precipitate on the addition of chloride of magnesium. The volatile nature of ammonia easily distinguishes it if present; and the best test for determining whether the fixed alkali be potassa or soda is chloride of platinum[3], which forms an immediate precipitate with potassa or any salt containing it, but is not at all affected by soda. The quantity of an alkali is determined by saturating it with sulphuric acid, and noting the quantity of real acid[4] necessary; setting down, for every 100 grains of real acid used, 121·48 of potassa, or 78·32 of soda. The loss of weight produced by the effervescence on dropping in the acid, being added to the above, shows the quantity of an alkaline carbonate.

b. *Iodine* is detected by starch. Iodides by starch and chlorine.

c. *Earthy carbonates.* If the water contains sulphuretted hydrogen gas, this must be separated by exposing the water for a considerable time to the air,

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[1] Dr. Henry.

[2] This test is sufficiently delicate to detect soda when it amounts to $\frac{1}{2217}$th part only of the water.

[3] Sulphate of lime likewise produces the same effect.

[4] For a rule to determine the quantity of real acid in a diluted acid, see Introduction.

before the quantities of the earthy carbonates can be estimated. After this, boil the water for fifteen minutes, filter it when cold; and treat what remains on the filter with hydrochloric acid, which will dissolve the carbonates of lime, of magnesia, and of iron. The residuum, which may contain carbonate of alumina, and, perhaps, sulphate of lime, is to be dried in a red heat, and its weight noted; and then boiled in a solution of carbonate of soda. The soda is next to be saturated with hydrochloric acid, and the mixture boiled for half an hour, which precipitates carbonate of lime and alumina. This precipitate being dried, the lime is to be separated by acetic acid, and the alumina that remains dried and weighed; so that, by subtracting its weight from the original weight, the proportion of sulphate of lime is ascertained.

To estimate the contents of the hydrochloric solution, add to it ammonia as long as it throws down a reddish precipitate, which is the iron united with a portion of magnesia. Separate the magnesia by acetic acid, the precipitate being previously dried by exposure to the air, in a heat of 200°, and the solution added to the hydrochloric solution. To determine the weight of the iron, redissolve it in hydrochloric acid, then precipitate it by an alkaline carbonate, and dry, and weigh.

Sulphuric acid is now to be added to the hydrochloric solution; and the sulphate of lime, thus obtained, is to be heated to redness, and weighed; setting down for every 100 grains of it 74 of carbonate of lime. From the solution the magnesia is lastly to be separated by carbonate of soda, dried and weighed: then evaporate the remaining solution to dryness, and wash the residue with distilled water, so as to dissolve the chloride of sodium. This residue is carbonate of magnesia, the weight of which, when dried, must be added to the former; which gives the entire weight of the carbonate of magnesia.

3. MINERAL ACIDS exist in mineral water, sometimes uncombined, but generally combined with alkalies and earths, forming sulphates.

a. SULPHURIC ACID is readily detected by chloride of barium, when it does not exceed the millionth part of the water. To render this test certain, however, the chloride must be diluted; the alkaline carbonates, if the water contain any, must be previously saturated with hydrochloric acid; and the precipitate must be insoluble in hydrochloric acid. The hydro-sulphurets are precipitated by chloride of barium, but their presence is easily detected by their odour.

The proportion of sulphuric acid is easily estimated by saturating it with barytic water, and heating the precipitate to ignition: every 100 grains of this sulphate of baryta indicate 34 of real sulphuric acid.

b. The *Sulphates* contained in mineral waters are six in number, and are incompatible with the following salts placed in the opposite column: —

Fixed alkaline sulphates -	Nitrates of lime and of magnesia. Chorides of calcium and of magnesium.
Sulphate of lime - - -	Alkalies. Carbonate of magnesia. Chloride of barium.
Alum - - - - - - - -	Alkalies. Chloride of barium. Nitrate of lime, carbonate of lime. Carbonate of magnesia.
Sulphate of magnesia - -	Alkalies. Chloride of barium Nitrate of lime, chloride of calcium.
Sulphate of iron - - -	Alkalies. Chloride of barium. Earthy carbonates.

b. 1. *Sulphate of Soda.* To detect this salt, first evaporate the water to one half, and add lime-water as long as any precipitate falls. This precipitates all the earths except sulphate of lime, which may be separated by evaporating the fluid till it becomes concentrated, then adding a little alcohol, and after filtration a little oxalic acid. If lime-water produces a precipitate in the water thus treated, immediately, or after a little alcohol be added, either sulphate of potassa or of soda is present. To determine which, add acetate of baryta, which will precipitate sulphate of baryta; then filter and evaporate the filtered fluid to dryness, and dissolve the residue by digesting it in alcohol, and evaporate to dryness. If the sulphate be sulphate of potassa, the dry salt thus obtained, being acetate of potassa, will deliquesce; but if it be sulphate of soda, the acetate will effloresce.

The proportion of the alkaline sulphates is found by precipitating their acid, by nitrate of baryta, from the purified water. If soda be the base of the salt contained in the water, for every 100 grains of this precipitate ignited, set down 61·2 grains of dried sulphate of soda; if potassa be the base, for 100 grains of ignited precipitate set down 74·8 of dry sulphate of potassa.

b. 2. *Sulphate of lime* is detected by an immediate precipitate being formed by oxalate of potassa. To determine its quantity, first saturate any earthy carbonates that may be present with nitric acid; then evaporate the fluid to a few ounces; and having precipitated the sulphate of lime by means of proof spirit, dry and weigh it.

b. 3. *Alum* is detected by carbonate of magnesia, chloride of calcium, chloride of magnesium, or succinate of ammonia. Twelve grains of alumina precipitated by carbonate of magnesia, heated to incandescence, indicate 100 grains of crystallised alum, or 49 of the dried salt.

b. 4. *Sulphate of magnesia* may be detected in any water (previously freed from any alum or uncombined acids) by hydro-sulphuret of strontian, which produces an immediate precipitate with this salt, and with no other. If no other earthy sulphate be present, the sulphuric acid may be separated by a barytic salt; every 100 grains of the ignited precipitate indicating 51 grains of dried sulphate of magnesia. If sulphate of iron be present, mix the water with a portion of argil, and expose it for some days to the air, during which time oxide of iron and sulphate of alumina are precipitated, leaving the sulphate of magnesia alone in solution; which may be then estimated by the above method.

b. 5. *Sulphate of iron* is detected by tincture of galls striking a black colour with the water after it has been boiled, and has cooled. Its quantity may be estimated by precipitating the iron by ferro-cyanide of potassium.[1]

c. HYDROCHLORIC ACID, either uncombined or combined, is detected by nitrate of silver, which forms with it a white precipitate insoluble in nitric acid; but the alkaline carbonates, if any, must be first saturated by nitric acid, and any sulphuric acid removed by nitrate of baryta. The proportion of uncombined acid is ascertained by saturating it with barytic water, and then precipitating the baryta by sulphuric acid. For every 100 grains of the ignited precipitate, set down 21 grains of real hydrochloric acid. Very minute portions of chlorides may be detected by putting into some pure nitric acid contained in a porcelain capsule a minute quantity of finely divided gold, precipitated from its solution by sulphate of iron, and then adding the supposed chloride. If it be a chloride, a light tint will be gradually formed round the gold.[2]

d. The *Chlorides* and *Hydrochlorates* contained in mineral waters are incompatible with the following articles in the second column: —

Chloride of barium	Sulphates. Alkaline carbonates. Earthy carbonates.
Chloride of calcium	Sulphates, except of lime. Alkaline carbonates. Carbonate of magnesia.
Chloride of magnesium	Fixed alkaline sulphates. Alkaline carbonates.

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[1] To make the calculation, the weight of a precipitate produced by the prussiate in a solution of a given weight of sulphate of iron in water must be previously determined.

[2] *Ann. de Chim.* xxviii. 26.

d. 1. *Hydrochlorates of soda and of potassa* are detected in water by acetate of silver: but any earthy nitrates and chlorides must first be decomposed by sulphuric acid, and the sulphates separated by alcohol and nitrate of baryta. To ascertain whether the precipitate be hydrochlorate of soda or of potassa, evaporate to dryness, then dissolve the acetate in alcohol, and again evaporate to dryness. If it be acetate of potassa the salt will deliquesce; but if acetate of soda, it will effloresce. To estimate the quantity of these salts, if they be unaccompanied by other salts, it is only necessary to dry and weigh the precipitate by nitrate of silver, setting down for every 100 grains of chloride of silver thus thrown down, 52 of chloride of potassium, and 41 of chloride of sodium. If alkaline carbonates be present, they must be first saturated with sulphuric acid, and sulphate of silver used to precipitate the hydrochloric acid.

d. 2. *Chloride of barium* is detected by sulphuric acid. It is rarely found.

d. 3. *Chloride of calcium.* To detect this salt the water must be first freed from the sulphates, then filtered, evaporated to dryness, the dry mass treated with alcohol, and the residue, after evaporating the alcohol, dissolved in water. If this solution yield a precipitate with acetate of silver, the water contained chloride of calcium.

d. 4. *Chloride of magnesium* is detected by separating the sulphates, and proceeding as in the former case. If the aqueous solution of the dry mass treated with alcohol afford no precipitate with carbonate of lime; and if sulphuric acid and evaporation, with the addition of a little alcohol, occasion no precipitate, the solution contains only magnesian salt.

d. 5. *Chloride of aluminum* is detected by first saturating any alkali the water may contain with nitric acid, and separating any sulphuric acid by nitrate of baryta; and then adding carbonate of lime, which produces a precipitate if this salt be present. This process also precipitates chloride of iron and of manganese, if any be present.

To estimate the quantities of these salts, which may all be contained in the same water, the earths, after separating any sulphates that may be present, are to be precipitated by baryta water, and redissolved in hydrochloric acid. They are then to be separated by the rules already mentioned, and separately weighed. For every 50 grains of lime, set down 100 of dried chloride of calcium; for 30 grains of magnesia, 100 of chloride of magnesium; and for 21·8 grains of alumina, 100 of chloride of aluminum. The barium of the chloride of barium, which the addition of the baryta water had formed in the mineral water by precipitating the earths, is now to be separated by sulphuric acid, and its hydrochloric acid expelled by heat; after which the chloride of sodium, which the water originally contained, is to be obtained by evaporation.

e. NITRIC ACID never exists in an uncombined state in mineral waters, and even the nitrates are comparatively of rare occurrence. The nitrates may be detected by an experiment, the inverse of that employed for detecting the chlorides; that is, by putting the fragment of gold into pure, colourless hydrochloric acid, and adding to it the suspected nitrate.

f. The *nitrates* are incompatible with the salts in the second column of the following table:—

Nitrate of lime - - -	Alkaline carbonates. Sulphates, except of lime. Carbonates of magnesia and alumina.
Nitrate of magnesia - -	Fixed alkaline sulphates.

f. 1. *Nitrate of potassa* may occur in mineral waters in conjunction with sulphates and chlorides; the former of which must be decomposed by acetate of baryta, and the latter by acetate of silver, before the nitrates can be estimated. After these previous steps, filter the water, evaporate it to dryness, and treat with alcohol; which dissolves the acetates, and leaves the nitre.

f. 2. *Nitrate of lime* is detected by first concentrating the water, and separating the sulphates by alcohol; then filtering and distilling off the alcohol, and separating any hydrochloric acid by acetate of silver; afterwards filtering again, evaporating to dryness, and dissolving the residue in alcohol, which must be also distilled off, and the dried residue dissolved in water. If oxalic acid detect lime in this solution, the mineral water contains nitrate of lime; the quantity of which may be estimated by precipitating with sulphuric acid, and calculating the quantity of lime contained in the sulphate; and for every 35 grains of lime, setting down 100 grains of dry nitrate of lime.

f. 3. *Nitrate of magnesia* is detected by nearly the same means: but to the last watery solution, instead of oxalic acid, add potassa, as long as any precipitate appears. Filter this solution; evaporate and treat the dry mass with alcohol. If a residue of nitre remains, the mineral water contained nitrate of magnesia.

Such is the general method of ascertaining the components of mineral waters, and the proportion of the ingredients contained in any particular water. To render the analysis complete, many minutiæ must necessarily be attended to; but the detail of these would far exceed the limits which a work of this kind can admit of.

No. III.

ON THE ART OF PRESCRIBING MEDICINES.

INDEPENDENT of the knowledge of diseases and the treatment of them, much of the success of the practitioner depends on circumstances connected altogether with the form in which the remedies are exhibited. In prescribing a medicine, even the best calculated to fulfil the object of the practitioner, it is necessary to consider the age, sex, temperament, habits, and idiosyncrasy of the patient, before the dose can be properly apportioned; and as far as the medicine itself is regarded, the most convenient and agreeable form of exhibiting it; whether it should be given alone, or combined with other ingredients, and how far these are likely to impede, modify, or facilitate its operation. An attention to these circumstances is absolutely requisite to prevent the errors which too frequently occur in forming a prescription.

1. *Circumstances connected with the State of the Patient. Age.* — Here it must be observed, that the doses of the medicines described in the foregoing pages are those adapted for an adult; but, as in the two extremes of life, childhood and old age, the body is weaker, and in early youth more susceptible of all impressions, these quantities cannot be administered with safety in every case; and thence the judgment of the prescriber must be exercised. Under ordinary circumstances the following table, originally drawn up by Gaubius, may be considered as a sufficient guide for the young practitioner: —

Ages.	Proportional Quantities.		Doses.
For an adult	Suppose the dose to be - -	ONE	or 1 drachm.
Under 1 year	Will require only - -	$\frac{1}{12}$	— 5 grains.
2 years	———	$\frac{1}{8}$	— $7\frac{1}{2}$ grains.
3 ——	———	$\frac{1}{6}$	— 10 grains.
4 ——	———	$\frac{1}{4}$	— 15 grains.
7 ——	———	$\frac{1}{3}$	— 1 scruple.
14 ——	———	$\frac{1}{2}$	— $\frac{1}{2}$ drachm.
20 ——	———	$\frac{2}{3}$	— 2 scruples.
Above 21 ——	The full dose - - -		— 1 drach .
65 ——	The inverse gradation of the above.		

Sex. — Although some women possess as much bodily strength and vigour of constitution as the majority of men, yet the general greater delicacy and sensibility of the female frame, at every period of life, require not only caution in apportioning the doses of active medicines, which should be less than those ordered for men of the same age; but the medicines themselves should be such as are likely to fulfil the indications required, without much violence. The state of the uterine system likewise must not be overlooked in prescribing for a female. Thus the employment of aloetic and drastic purgatives, cinchona bark, sulphuric acid, and astringents, should be suspended during the period of the catamenia.

Temperament. — It is undoubtedly true, that persons of different temperaments or original conformations of body are differently affected by the operation of medicines. Stimulants more readily affect those of a sanguine than those of a phlegmatic temperament: and, therefore, smaller doses are required. In the phlegmatic, also, the bowels are generally torpid, and require both a description of purgatives and such doses of them to excite the proper peristaltic motion as would induce either visceral inflammation or be followed by an alarming state of debility, were they administered to those of a sanguine temperament. Hence the necessity of attending to this circumstance in prescribing.

Habits — have a considerable influence in modifying the operation of medicines. Persons addicted to the use of spirits, narcotics, and other stimulants, are less easily excited both by medical stimulants and narcotics; and the knowledge of the habits of a patient, as far as the exhibition of purgatives is concerned, is absolutely necessary for the prescriber, many people being in the almost daily habit of taking this class of remedies without consulting a medical practitioner. In the first of these cases, larger doses of stimulants and narcotics are required to produce the ordinary effects of these remedies; but in the second a change of the purgative usually taken will generally be sufficient. In the employment of medicines, also, which require to be long continued, the beneficial effect is soon lost if the doses be not increased.

Idiosyncrasy. — Many persons have a peculiarity of disposition, unconnected with temperament, which renders them liable to be affected by substances taken into the stomach, either in the form of food or of medicine, in a manner different from the majority of mankind. Such a state can be discovered only by accident or by time; but when it is known, it must be attended to by the practitioner. Instances in which opium proves deleterious in every form and dose, are not unfrequent. I knew a lady, in whom the smallest dose of squill excited an erythematic eruption over the whole body; spirit of turpentine, also, frequently produces a similar eruption; and many examples of the same kind might be quoted. But besides these guides in forming a prescription, the choice of the medicine must occasionally depend on the circumstance of the patient being more or less immediately under the eye of the prescriber. Thus, if the patient can be seen every day, or frequently, by the practitioner, the most active medicine which the nature of the case requires should be chosen; but if he cannot be frequently seen, or is not resident in the same place, the practitioner should choose a remedy of the same class, but less likely to have a sudden or violent effect. Thus, in prescribing for ascites under such circumstances, squill or acetate of potassa, or bitartrate of potassa, must be preferred to elaterium; for intermittent fever, cinchona bark to the arsenical solution; and so in other cases, when the patient is not under the eye of the prescriber.

2. *Of the Form and Composition of extemporaneous Prescriptions.* — In every prescription simplicity should be kept in view, and when one medicine will answer the intention of the prescriber, it ought to be preferred. The nauseous taste, however, and the other qualities of the great majority of drugs, require the addition of others to modify their action; but, although medicines are more generally prescribed in a compound form, yet the practice of accumulating a great variety of ingredients in one prescription must be avoided.

Medicines exhibited in the fluid form operate sooner, and with more certainty than in the solid state: but in choosing the vehicle or solvent, the taste of the patient ought not to be overlooked. Thus, for those to whom peppermint-water is not disagreeable, the nauseous taste of sulphate of magnesia is more completely concealed by that vehicle than any other; if cinchona bark in powder be ordered, milk effectually covers its taste, provided the dose be taken the moment it is mixed; and if aloes, the most nauseous article of the materia medica, be prescribed in a fluid form, a solution of extract of liquorice renders it by no means unpalatable. Medicines which, when given alone, produce griping, require the addition of aromatics to correct that quality; and when they operate with violence, mucilages and demulcents are sometimes necessary to obtund their acrimony, or narcotics to moderate their action. In prescribing purgatives, it is also necessary to consider the particular part of the alimentary canal on which they more immediately act. Thus rhubarb acts chiefly on the pylorus and duodenum, aloes on the rectum, and calomel and jalap on the larger intestines. Another reason for ordering medicines in a compound form, is the necessity of producing two or more effects at one time. Thus the same dose may be required, in a case of colic, for example, to allay pain and to open the bowels; or, in fever, to determine to the surface, to allay irritation, and to produce sleep. But in combining medicines, care must be taken not to bring together incompatibles, or substances that decompose each other, or chymically combine, and, consequently, alter the nature of the mixture, or render it inert; unless the resulting compound be the remedy on which the practitioner relies. Thus, acids and alkalies are incompatible, unless the neutral salt they produce be the remedy required; and astringent vegetable infusions and decoctions destroy the emetic and diaphoretic property of tartar emetic. Hence the necessity of a knowledge of chymistry to the medical practitioner.

In writing a prescription, the first object is the principal or most active ingredient, which is called the *basis;* the next, the *adjuvans,* or that which is designed to promote the action of the basis; the third, the *corrigens,* or that intended to correct or modify its action; and the last, the *vehiculum,* or that substance in which the more active ingredients are to be exhibited, and which, consequently, gives the formula its peculiar character. It has been usually regarded as a proper rule in writing a prescription to place the basis first, and the other articles in the form in which they have been enumerated; but this must depend on the mode best fitted for compounding the medicine. Thus, salts and other soluble solids should be placed before the menstruum in which they are to be dissolved; and volatile substances should always be placed last, as they are necessarily the last ingredients added in the manipulation of the compound. Finally, the names of each ingredient should be written at full length, in a legible hand, and the symbols of the quantities distinctly marked; and no prescription should pass from the hand of the prescriber without being deliberately read over, and its correctness ascertained.

To facilitate the art of prescribing to the young practitioner, I have added a Table of Incompatibles, and a few examples of the usual Forms of extemporaneous Prescriptions.

No. IV.

TABLE OF INCOMPATIBLES.

Substances	*Incompatible with*
Acidum Citricum - -	Alkalies. Alkaline Solutions. —— Sulphates. —— Carbonates. —— Tartrates. Soaps. Earthy Carbonates. Acetates. Metallic Carbonates.

Substances	*Incompatible with*
Acidum Hydrochloricum -	Alkalies. Tartrate of Potassa. Sulphuret of Potassium. Most Earths. —— Oxides. —— Carbonates of the incompatible Oxides. Tartarized Antimony. Tartrate of Iron. Nitrate of Silver. Solutions of Acetate and Diacetate of Lead.
—— Nitricum - -	Alkalies. Carbonates of Alkalies. Acetates of Alkalies. Earths. Oxides. Sulphate of Iron. Solutions of Acetates of Lead. Sulphurets. Cyanides. Iodides. Charcoal. Phosphorus. Sugar. Alcohol and Spirits. Volatile Oils.
—— Sulphuricum -	Alkalies. Alkaline Carbonates. Some Earths. —— Earthy Carbonates. Solution of Chloride of Calcium. Barytic Salts. Oxides of Metals. Solutions of Acetates of Lead.
—— Tartaricum - -	Alkalies. Carbonates of Alkalies. Salts of Potassa. Most Earths. —— Carbonates of Earths. Salts of Lime. —— Lead.
Ammoniæ Liquor - -	All Acids. Saline Solutions of most Earths, except Baryta and Lime.
—— Sesquicarbonas	Acids. Potassa. Soda.
—— Carbonas -	Carbonate of Soda. —— Potassa. Bisulphate of Potassa. Bitartrate of Potassa. Lime. —— water. Solution of Chloride of Calcium. Magnesia. Sulphate of Magnesia. Alum. Salts of Iron, except Potassio-Tartrate of Iron. Sulphate of Zinc. Bichloride of Mercury. Acetate of Lead. Diacetate of Lead.

Substances	*Incompatible with*
Ammoniæ Acetatis Liquor	Acids.
	Potassa.
	Soda.
	Carbonate of Potassa.
	———— Soda.
	Lime-water.
	Magnesia.
	Sulphate of Magnesia.
	Bichloride of Mercury.
	Sulphate of Iron.
	———— Copper.
	———— Zinc.
	Nitrate of Silver.
	Acetate of Lead.
	Diacetate of Lead.
Piperina - - -	Carbonates of Alkalies.
	Ferro-cyanide of Potassium.
	Aqueous Solutions.
Potassæ Carbonas - -	Acids.
	Acidulous Salts.
	Hydrochlorate of Ammonia.
	Acetate of Ammonia.
	Lime-water.
	Chloride of Calcium.
	Sulphate of Magnesia.
	Disulphate of Quina.
	Alum.
	Tartarized Antimony.
	Nitrate of Silver.
	Ammoniated Copper.
	———— Iron.
	Tincture of Ammoniated Iron.
	———— Chloride of Iron.
	Sulphate of Zinc.
	Calomel.
	Bichloride of Mercury.
	Acetate of Lead.
	Diacetate of Lead.
	Iodide of Iron.
	———— Zinc.
	———— Arsenic.
——— Carbonatis Liquor -	The same as with Potassæ Carbonas.
——— Bicarbonas - -	Nearly the same as with Potassæ Carbonas, except
	Sulphate of Magnesia.
	Disulphate of Quina.
	Calomel, unless heated.
——— Liquor - -	Acids.
	Acidulous Salts.
	Carbonate of Ammonia.
	Acetate of Ammonia.
	Hydrochlorate of Ammonia.
	Preparations of Earths and of Oxides of Metals held in Solution by Acids.
	Calomel.
	Bichloride of Mercury.
——— Acetas - -	Sulphuric Acid.
	Hydrochloric ——.
	Nitric ——.
	Sulphate of Soda.
	———— Magnesia.
	Most Metallic Salts.
	—— Earthy Salts.

Substances	*Incompatible with*
Potassæ Tartras	Most Acids. —— Acidulous Salts. Lime-water. Chloride of Calcium. Salts of Lead. —— Silver.
—— Bisulphas	Alkalies. Earths. Carbonates of Earths. Oxides.
—— Sulphas	Tartaric Acid. Baryta Water. Chloride of Barium. —— Calcium. Acetate of Lead. Diacetate of Lead.
Quinæ Disulphas	Chloride of Barium. —— Calcium. Tincture of Galls. Acetate of Lead. Diacetate of Lead.
Sodæ Carbonas	Acids. Acidulous Salts. Hydrochlorate of Ammonia. Earthy and Metallic Salts. Lime-water.
—— Bicarbonas	The same as those of Sodæ Carbonas.
—— Sulphas	Carbonate of Potassa. Solution of Baryta. Barytic Salts. Chloride of Calcium. Nitrate of Silver. Acetate of Lead. Diacetate of Lead.
—— Potassio-tartras	Most Acids. —— Acidulous Salts, except Bitartrate of Potassa. Barytic Salts. Salts of Lime. Acetate of Lead. Diacetate of Lead.
Alum	Alkalies. Carbonates of Alkalies. Tartrate of Potassa. Lime. Carbonate of Lime. Chloride of Barium. Magnesia. Carbonate of Magnesia. Acetate of Lead.
Barii Chloridum	Sulphates. Alkaline Carbonates. Earthy Carbonates.
Creta Preparata	Acids. Acidulous Salts. Preparations of Ipecacuanha.
Calx	Acids. Acidulous Salts. Alkaline Carbonates. Ammoniacal Salts. Borates. Metallic Salts. Astringent Vegetable Infusions.

Substances	*Incompatible with*
Calcis Liquor - -	The same substances as with Calx.
Calcii Chloridum - -	Sulphuric Acid. Sulphates, except of Lime. Potassa. Soda. Carbonate of Potassa. ——— Soda. ——— Ammonia. ——— Magnesia.
Magnesiæ Sulphas - -	Potassa. Soda. Ammonia. Carbonate of Potassa. ——— Soda. Lime-water. Chloride of Calcium. Acetate of Lead.
——— Carbonas - -	Acids. Acidulous Salts. Hydrochlorate of Ammonia. Lime-water. Metallic Salts.
Magnesia - - -	Same as with Magnesiæ Carbonas, except Lime-water.
Antimonii Potassio-tartras	Its solution is incompatible with Alkalies. Alkaline Carbonates. Some Earths. Lime-water. Chloride of Calcium. Some Metals. —— Oxides of Metals. Acetates of Lead. Infusions of Cinchona. ——— Rhubarb. ——— Catechu.
Argenti Nitras - -	Spring Water. River Water. Potassa. Soda. Carbonate of Potassa. ——— Soda. Soaps. Lime-water. Sulphuric Acid, Hydrochloric ——, Tartaric ——, and Salts containing these Acids. Carbonate of Ammonia. Liquor Potassæ Arsenitis. Sulphureted Hydrogen. Hydrosulphurets. Astringent Vegetable Infusions. Decoction of Yellow Cinchona Bark.
Liquor Potassæ Arsenitis -	Acids. Acidulous Salts. Lime-water. Chloride of Calcium. Sulphate of Magnesia. Alum. Sulphate of Iron.

Substances	*Incompatible with*
Liquor Potassæ Arsenitis	Chloride of Iron. Iodide of Iron. Nitrate of Silver. Sulphate of Copper. Sulphureted Hydrogen and its Compounds. Decoction of Cinchona.
Cupri Ammonio-sulphas	Acids. Potassa. Soda. Lime-water.
Ferri Sulphas	Potassa. Soda. Ammonia. Carbonate of Potassa. ——— Soda. Baryta. Chloride of Barium. Salts of Baryta. Lime-water. Chloride of Calcium. Soaps. Nitrate of Silver. Acetates of Lead. Astringent Vegetable Infusions and Decoctions.
—— Sesquioxydum	Acids. Acidulous Salts.
—— Sesquichloridi Tinctura	Alkalies. Carbonates of Alkalies. Lime-water. Carbonate of Lime. Magnesia. Carbonate of Magnesia. Astringent Vegetable Bodies. Solution of Gum Arabic.
Ferri Ammonio-chloridum	Alkalies. Alkaline Carbonates. Lime-water. Astringent Vegetable Bodies.
—— Vinum	The same as with Ferri Sesquichloridi Tinctura.
Hydrargyrum cum Creta	Acids. Acidulous Salts.
Hydrargyri Binoxydum	Acids. Acidulous Salts. Sulphureted Hydrogen.
——— Bichloridum	Potassa. Soda. Ammonia. Carbonate of Potassa. Carbonate of Soda. ——— Ammonia. Sulphuret of Potassium. All Hydrosulphurets. Soap. Lime-water. Potassio-tartrate of Antimony. Nitrate of Silver. Acetates of Lead. Infusion of Bitter Vegetables. ——— Astringent Vegetables.

Substances	*Incompatible with*
Hydrargyri Chloridum -	Potassa. Soda. Ammonia. Alkaline Carbonates. Hydrosulphurets. Lime-water. Salts of Iron. ——— Lead. ——— Copper.
Plumbi Acetas - -	Sulphuric Acid. Hydrochloric —— Carbonic —— Citric —— Tartaric —— Potassa. Soda. Ammonia. Chloride of Sodium. Liquor Ammoniæ Acetatis. Lime-water. Carbonate of Lime. Sulphate ——— Solution of Sulphureted Hydrogen. Hard Water usually. All Vegetable Infusions containing Gum. Astringent Infusions. Strychnia.
——— Diacetatis Liquor -	Same as with Plumbi Acetas.
Zinci Sulphas - -	Alkalies. Alkaline Carbonates. Lime-water. Hydrosulphurets. Astringent Vegetable Infusions.
—— Oxydum - -	Acids. Acidulous Salts. Alkalies.
Potassii Sulphuretum -	Acids which combine with Potassa and expel Sulphureted Hydrogen Gas. Solutions of most of the Metals.
Infusum Anthemidis -	Salts of Iron. ——— Mercury. ——— Silver. ——— Lead.
——— Armoraciæ Comp. -	Alkaline Carbonates. Salts of Silver. ——— Mercury.
——— Calumbæ - -	Lime-water. Acetates of Lead. Bichloride of Mercury.
——— Caryophyllorum -	Lime-water. Solutions of the Preparations of Iron. ——————————— Zinc. ——————————— Lead. ——————————— Silver. ——————————— Antimony.
——— Cascarillæ - -	The same as with Infusum Caryophyllorum.
——— Cuspariæ - -	Solutions of the Salts of most Metals.
——— Digitalis - -	——————— Iron. Probably by those of most other Metals.
——— Gentianæ Comp. -	Solution of Acetate of Lead. ———— Persulphate of Iron.

Substances	*Incompatible with*
Infusum Lini Compositum	Preparations of Lead. ———— Iron. Most Metallic Salts.
—— Rhei - - -	The stronger Acids. Metallic Solutions. Some astringent Infusions.
—— Rosæ Compositum -	Alkalies. Earths and all substances which combine with Sulphuric Acid, or are acted upon by small quantities of it. Acetate of Lead. Sulphate of Iron.
—— Sennæ Compositum	Strong Acids. Lime-water. Most Metallic Salts.
—— Simarubæ - -	Alkaline Carbonates. Lime-water. Salts of Lead. —— Silver. —— Mercury.
Decoctum Aloes Compositum	Acids. Acidulous Salts. Earthy Salts. Metallic Salts. All substances which are decomposed by, or which decompose Carbonate of Potassa.
—— Cydoniæ - -	Acids. Alcohol. Most Metallic Solutions.
—— Quercûs - -	Alkaline Solutions. Most Metallic Salts. Solutions of Isinglass. Decoction of Yellow Bark.
—— Sarzæ - -	Lime-water. Acetate of Lead.
Mistura Ferri Composita -	Acids } which dissolve the Proto- Acidulous Salts } carbonate of Iron. Vegetable Astringents.
Spiritus Ammoniæ Aromaticus	Acids. Acidulous Salts. Earthy —— Lime-water. Metallic Salts.
———— Fœtidus	The same as in Sp. Ammoniæ Arom.
———— Succinatus	Acids. Acidulous Salts. Earthy —— Metallic ——
—— Camphoræ -	Water.
Tinctura Opii - - -	Potassa and its Carbonate. Soda ———— Ammonia ———— Most Metallic Salts. Infusion of Galls.

Infusion of Galls

Infusion of Galls

No. V.

EXAMPLES OF A FEW OF THE MOST USUAL FORMS OF EXTEMPORANEOUS PRESCRIPTIONS.*

POWDERS.

NARCOTIC.

℞ *Conii pulveris* gr. ii.
Glycyrrhizæ radicis pulveris gr. vi.
Sit pulvis ter quotidie sumendus.
In schirrhous affections, scrofula, painful old ulcers, &c.

℞ *Belladonnæ foliorum pulveris* gr. i.
Potassæ Nitratis pulveris gr. x.
Sacchari pulveris gr. ix.
Fiat pulvis hora somni quotidie umendus.
In chronic rheumatism, extensive ulcerations, mania, and epilepsy.

ANTISPASMODIC.

℞ *Valerianæ radicis pulveris* ℈i.
Cinnamomi comp. pulveris gr. x.
Fiat pulvis ter quaterve quotidie sumendus.
In hysteria, hemicrania, chlorosis.

℞ *Ipecacuanhæ radicis pulveris* gr. iii.
Sodæ carbonatis pulveris gr. xii.
Opii pulveris gr. i.
Fiat pulvis octava quaque hora sumendus.
Spasmodic asthma; hooping-cough.

TONIC.

℞ *Cinchonæ cordifoliæ pulveris* ʒss.
Cinnamomi comp. pulveris gr. x.
Sit pulvis, secundus horis in cyatho lactis, absente febris paroxysmo, sumendus.
In intermittents, after the stomach and bowels have been cleared.

℞ *Ferri potassio-tartratis* gr. viii.
Calumbæ pulveris ℈i.
Fiat pulvis quarta quaque hora sumendus.
After diarrhœa, in scrofulous tumours and in dyspepsia.

℞ *Simarubæ corticis pulveris* ℈i.
Opii pulveris gr. ¼.
Pulvis tertia quaque hora sumendus.
In dysentery, after the bowels have been well cleared.

ASTRINGENT.

℞ *Catechu pulveris* gr. xv.
Cretæ comp. cum Opio pulveris ℈i.
Sit pulvis post dejectiones singulas liquidas sumendus.
In diarrhœa, from a weakened state of the bowels.

℞ *Kino compositi pulveris* gr. x.
Pulvis ex cyatho aquæ menthæ viridis, sexta quaque hora sumatur.
In chronic diarrhœa and in intestinal hæmorrhages.

EMETIC.

℞ *Ipecacuanhæ pulveris* ℈i.
Antimonii potassio-tartratis gr. i.
Fiat pulvis emeticus.

CATHARTIC.

℞ *Hydrargyri chloridi* gr. iii.
Jalapæ pulveris gr. xvi.
Sacchari, sing. gr. x.
Sit pulvis, vespere vel primo mane sumendus.
In bilious fevers, and slimy and obstructed bowels.

℞ *Hydrargyri chloridi* gr. iii.
Scammonii compositi pulveris gr. xii.
Tere in pulverem quamprimum sumendum.
In worm cases.

℞ *Potassæ bitartratis* gr. xv.
Cambogiæ,
Sacchari, singulorum gr. v.
Sit pulvis mane sumendus.
In ascites, and other dropsical cases.

℞ *Potassæ sulphatis* ʒi.
Rhei pulveris ℈iss.
Florum Anthemidum pulveris ʒi.
Tere in pulverem, et divide in doses æquales sex, quarum sumat unam bis die in quovis vehiculo.
In dyspepsia, and a sluggish state of the bowels.

EMMENAGOGUE.

℞ *Foliorum Sabinæ pulveris,*
Zingiberis pulveris āā gr. vii.
Boracis gr. xv.
Fiat pulvis bis in die sumendus.
In amenorrhœa with a languid pulse.

DIURETIC.

℞ *Potassæ bitartratis* ʒi.
Scillæ siccatæ pulveris gr. ii.

* The doses are those proper for adults.

Zingiberis pulveris gr. iv.
Sit pulvis octava quaque hora sumendus.
In ascites.

Diaphoretic.

℞ *Antimonialis pulveris*, gr. iii.
Tragacanthæ comp. pulveris gr. x.
Sit pulvis quarta vel sexta quaque hora sumendus.

In the commencement of febrile diseases, after emptying the stomach and bowels.

℞ *Antimonii potassio-tartratis* gr. ii.
Testarum præparatarum ℈ii.
Intime misceantur in pulverem, et divide in doses æquales decem, quarum sumat unam tertia quaque hora.

In puerperal fever, after bleeding, and the exhibition of a clyster.

℞ *Ipecacuanhæ pulveris* gr. ii.
Opii pulveris gr. iss.
Potassæ Nitratis gr. xviss.
Fiat pulvis hora somni capiendus.
In acute rheumatism.

Expectorant.

℞ *Ipecacuanhæ pulveris* gr. vi.
Potassæ Nitratis pulveris ℈iss.
Myrrhæ pulveris gr. xii.
Misce, et divide in doses æquales quatuor, quarum sumat unam quarta quaque hora.

In asthma, and the earlier stage of phthisis pulmonalis.

Refrigerant.

℞ *Potassæ Nitratis* gr. viii.
Tragacanthæ pulveris comp. ℈i.
Tere in pulverem, quartis horis in cyatho aquæ vel infusi lini sumendum.
In gonorrhœa.

Pills.

Narcotic.

℞ *Opii* gr. i.
Fiat pilula hora somni sumenda.
To procure sleep in ordinary cases.

℞ *Digitalis pulveris* gr. iv.
Camphoræ gr. xii.
Hyoscyami extracti gr. xii.
Fiant pilulæ duodecim. Sumat tres nocte quotidie.
In maniacal and spasmodic affections.

Sedative.

℞ *Plumbi Acetatis,*
Digitalis pulveris, āā gr. x.
Opii pulveris gr. iii.
Acaciæ mucilaginis q. s.
Misce optime, et divide in pilulas æquales decem, quarum sumat unam sexta quaque hora.

In active hæmorrhages. They have also been given in phthisis, one pill twice a day, after bleeding.

Antispasmodic.

℞ *Opii* gr. ss.
Castorei Rossici gr. viss.
Digitalis pulveris, gr. i.
Syrupi q. s.
Fiant pilulæ, duæ bis vel ter die repetendæ.
In spasmodic asthma and dyspnœa.

℞ *Cupri Ammoniati* gr. ii.
Panis micæ q. s.
Fiant pilulæ quatuor. Sumat unam bis quotidie.

In epilepsy, gradually increasing the dose.

Stimulant.

℞ *Assafœtida Gummi resinæ* ʒii.
Zingiberis pulveris ʒss.
Ammoniæ sesquicarbonatis, āā ʒss.
Syrupi q. s.
Ut fiant pilulæ triginta, quarum suma tres tertia quaque hora.
In palsy.

Tonic.

℞ *Rhei pulveris,*
Zingiberis pulveris āā ʒss.
Anthemidis extracti ʒi.
Fiat massa in pilulas æquales triginta, dividenda, quarum capiat tres ante prandium quotidie.
In dyspepsia and chlorosis.

℞ *Ferri Carbonatis,*
Conii extracti, āā ʒi.
Distribue in pilulas æquales viginti quatuor. Sumat duas bis in die.
In fluor albus and scrofula.

Astringent.

℞ *Cinchonæ extracti* ʒii.
Aluminis, ʒi.
Syrupi q. s.
Ut fiant pilulæ triginta sex. Sumat quatuor quarta vel sexta quaque hora.
In passive hæmorrhages.

Cathartic.

℞ *Scammonii in pulv.* gr. iv.
Taraxaci extracti gr. xvi.
Fiant pilulæ sex, quarum sumat tres bis in die.

In hypochondriasis and chronic hepatitis.

℞ *Hydrargyri chloridi* gr. iii.
Jalapæ pulveris gr. ix.
Acaciæ mucilaginis q. s.
Fiant pilulæ tres hora somni sumendæ.

To empty the bowels in bilious affections.

℞ *Aloes pulveris compositi* ℨi.
Jalapæ pulveris ℈ii.
Lavandulæ olei min. x.
Syrupi q. s.
Ut fiant pilulæ triginta. Sumat duas vel tres, adstricto alvo.

In habitual costiveness.

℞ *Rhei pulveris* ℨiss.
Saponis gr. xv.
Aquæ q. s.
Ut fiant pilulæ viginti quatuor. Sumat tres vel quatuor pro re nata.

In costiveness arising from a deficiency of bile in the intestinal canal.

EMMENAGOGUE.

℞ *Ferri Sulphatis* ℨss.
Potassæ carbonatis gr. x.
Myrrhæ ℨi.
Aloes pulveris compositi ℨss.
Contunde simul, et divide massam in pilulas æquales triginta. Sumat tres bis quotidie.

In amenorrhœa with languid pulse.

℞ *Hydrargyri pilulæ* ℨi.
Divide in pilulas æquales quindecim. Sumat unam mane nocte quotidie.

In suppression of the menstrual discharge.

DIURETIC.

℞ *Digitalis pulveris* gr. xii.
Calomelanos gr. iv.
Opii gr. iv.
Rosæ confectionis q. s.
Fiant pilulæ duodecim. Sumat unam octava quaque hora.

In hydrothorax, and ascites depending on some visceral obstruction.

℞ *Hydrargyri pilulæ* ℨi.
Scillæ pulveris ℈i.
Rosæ Confectionis q. s.
Fiant pilulæ viginti. Sumat unam octava quaque hora.

In ascites and anasarca.

DIAPHORETIC.

℞ *Antimonii potassio-tartratis* gr. ¼.
Opii,
Hydrargyri chloridi āā gr. i.
Rosæ confectionis q. s.
Fiant pilulæ æquales duæ hora somni sumendæ.

In acute rheumatism.

℞ *Antimonii potassio-tartratis* gr. ii.
Opii, gr. vi.
Camphoræ gr. xxxvi.
Spiritus rectificati min. iii.
Rosæ confectionis q. s.
Fiant pilulæ æquales duodecim, quarum sumat unam quarta quaque hora.

In fevers.

EXPECTORANT.

℞ *Scillæ pulveris* gr. xxx.
Ammoniaci gum. res. ℨiss.
Conii extracti gr. xxx.
Contunde simul, et divide massam in pilulas æquales triginta, quarum sumat duas sextus horis.

In asthma and chronic catarrh.

SIALOGOGUE.

℞ *Hydrargyri pilulæ* ℨi.
Divide in pilulas æquales duodecim. Sumat unam mane nocteque quotidie.

In syphilis, herpetic eruptions, and chronic hepatitis.

℞ *Hydrargyri chloridi* ℈i.
Opii gr. v.
Rosæ confectionis q. s.
Fiant pilulæ viginti. Sumat unam mane et nocte quotidie.

In syphilitic cases.

LITHONTRIPTIC.

℞ *Sodæ carbonatis exsiccatæ* ℨiss.
Cinnamomi pulveris comp. ℨss.
Saponis ℨss.
Balsami Peruviani q. s.
Fiant pilulæ æquales triginta. Sumat tres ter quotidie.

In calculous affections.

TONIC AND PURGATIVE COMBINED.

℞ *Ferri Ammoniati* ℨi.
Aloes extracti,
Gentianæ extracti, āā ℨss.
Contunde simul, et divide massam in pilulas triginta, quarum sumat duas ter quotidie.

In dyspepsia, hysteria, scrofula, and mesenteric obstructions.

DIAPHORETIC AND ALTERATIVE.

℞ *Hydrargyri sulphureti rubri,*
Serpentariæ radicis in pulv. āā ℨi.
Aurantii syrupi q. s.
Misce, et divide in pilulas viginti quatuor, quarum sumat quatuor ter quotidie.

In herpetic and other obstinate cutaneous affections.

DRAUGHTS.

NARCOTIC.

℞ *Camphoræ misturæ* f℥iss.
Opii tincturæ ♏xxxv.
Ætheris sulphurici fʒi.
Croci syrupi fʒi.
Fiat haustus in promptu habendus, et urgente febris paroxysmo sumendus.
In intermmittent headach.

℞ *Ammoniæ sesquicarbonatis* gr. xv.
Limonis recentis succi fʒiv.
Aquæ distillatæ f℥i.
Myristicæ spiritus fʒi.
Aurantii syrupi fʒss.
Conii extracti gr. iv.
Fiat haustus ter die sumendus, addendo de die in diem Conii extracti gr. i. *donec dosis ad* gr. vii. *pervenerit in singulis haustibus.*
In diseases of increased irritability.

℞ *Potassæ carbonatis* ℈i.
Limonum recentis succi fʒiv.
Menthæ viridis aquæ f℥i.
Opii tincturæ ♏xxv.
Tolutani syrupi fʒss.
Fiat haustus hora somni, vel vespertino, vel sera nocte, sumendus.
To procure sleep in the majority of diseases.

ANTISPASMODIC.

Moschi misturæ fʒxiv.
Ammoniæ liquoris ♏xvi.
℞ *Castorei tincturæ* fʒi.
Papaveris syrupi fʒss.
Fiat haustus, quarta quaque hora sumendus.
In hysteria, and convulsive affections, after the bowels have been effectually cleared.

℞ *Anisi olei* ♏x.
Magnesiæ ℈i.
Sennæ tincturæ fʒii.
Menthæ piperitæ aquæ fʒx.
Fiat haustus, urgente flatulentia sumendus.
In spasm of the stomach arising from flatulence.

TONIC.

℞ *Cinchonæ cordifoliæ infusi* fʒiss.
Cinchonæ tincturæ comp. fʒi.
Cinchonæ cordifoliæ pulveris ℈ii.
Aurantii syrupi fʒss.
Fiat haustus, secunda quaque hora sumendus.
In intermittents, and acute rheumatism after purging.

℞ *Cascarillæ infusi* f℥iss.
Cascarillæ tincturæ,
Zingiberis tincturæ, āā fʒi.
Fiat haustus, bis quotidie sumendus.
In dyspepsia, arising from intemperance.

℞ *Myrrhæ* gr. v.
Potassæ Nitratis gr. iv.
Papaveris syrupi f℥ss.
Calumbæ infusi fʒxvss.
Fiat haustus, ter in die sumendus.
In humoral asthma, chronic catarrh, and phthisis pulmonalis, unattended by much active inflammation.

ASTRINGENT.

℞ *Hæmatoxyli extracti* gr. xii.
Cinnamomi aquæ fʒxv.
Catechu tincturæ fʒi.
Fiat haustus, quarta quaque hora vel post dejectiones singulas liquidas, sumendus.
In diarrhœas and protracted dysentery.

EMETIC.

℞ *Ipecacuanhæ pulveris* ℈i.
Ipecacuanhæ vini fʒii.
Aquæ communis fʒvi.
Fiat haustus emeticus, quamprimum vel vespere sumendus.
For unloading the stomach in ordinary cases.

℞ *Zinci Sulphatis* ℈i.
Aquæ distillatæ fʒx.
Fiat haustus, quamprimum sumendus.
In the commencement of the paroxysm of intermittent fever, or in cases of poisons having been taken into the stomach.

℞ *Cupri Sulphatis* gr. x.
Aquæ distillatæ f℥ii.
Fiat haustus emeticus, statim sumendus.
To excite immediate vomiting, when laudanum has been taken as a poison.

CATHARTIC.

℞ *Potassæ Tartratis* ℥i.
Senna tincturæ fʒi.
Sennæ infusi fʒxivss.
Croci syrupi fʒss.
Fiat haustus, quamprimum vel primo mane sumendus.
In acute diseases.

℞ *Magnesiæ Sulphatis* ʒii.
Rosæ infusi fʒxiv.
Sulphurici Acidi diluti ♏x.
Mannæ ʒii.
Fiat haustus, quartis horis sumendus.
In inflammatory affections.

℞ *Magnesiæ Carbonatis* ʒi.
Rhei pulveris ℈i.
Menthæ piperitæ aquæ fʒxii.

Cardamomi tincturæ compositæ f ʒi.
Fiat haustus, hora ante prandium sumendus.
In dyspepsia, attended with costiveness and acidity.
℞ *Ricini olei* fʒv.
Vitelli ovi q. s.
Rosæ aquæ fʒviii.
Lavandulæ tinct. comp. ♏viii.
Papaveris syrupi fʒi.
Fiat haustus statim sumendus.
In colic and calculous affections.

DIURETIC.

℞ *Jalapæ tincturæ* f ʒiii.
Scillæ aceti fʒi.
Menthæ piperitæ aquæ f ʒviii.
Fiat haustus ter in die sumendus.
℞ *Potassæ Nitratis* gr. viii.
Digitalis tincturæ ♏xvi.
Rosæ infusi fʒxiii.
Rosæ syrupi fʒi.
Fiat haustus ter in die sumendus.
In dropsy.

DIAPHORETIC.

℞ *Potassæ carbonatis* ℈i.
Limonis recentis succi fʒiv.
Antimonii potassio-tartratis gr. $\frac{1}{6}$.
Aquæ distillatæ fʒxi.
Papaveris syrupi fʒi.
Fiat haustus, quarta vel sexta quaque hora sumendus.

℞ *Ammoniæ liquoris Acetatis* fʒvi.
Camphoræ misturæ fʒx.
Ipecacuanhæ vini ♏xx.
Tolutani syrupi fʒss.
Fiat haustus sextis horis sumendus.
In fevers and inflammatory diseases.

REFRIGERANT.

℞ *Potassæ Nitratis* gr. xii.
Amygdalæ misturæ f℥iss.
Tolutani syrupi fʒi.
Fiat haustus quarta quaque hora sumendus.
℞ *Potassæ carbonatis* ℈i.
Syrupi fʒss.
Myristicæ spiritus fʒss.
Aquæ distillatæ f℥xi.
Fiat haustus in effervescentia cum succi limonis cochleare magno, secunda quaque hora sumendus.
In fevers and inflammatory diseases.

ANTACID.

℞ *Magnesiæ* ʒi.
Menthæ piperitæ aquæ fʒiss.
Aurantii tincturæ fʒi.
Fiat haustus pro re nata sumendus.
In heartburn, and other cases of acidity of the stomach.
℞ *Liquoris Ammoniæ* ♏xvi.
Amygdalæ misturæ f℥ii.
Opii tincturæ ♏x.
Fiat haustus ter die sumendus.
In acidities of the primæ viæ.

MIXTURES.

TONIC.

℞ *Calumbæ infusi* f℥vss.
Cinnamomi tincturæ compositæ fʒii.
Aurantii syrupi f℥ii.
Fiat mistura, cujus cochlearia duo majora quarta quaque hora sumantur.
In debilities of the digestive organs; and to check the severe vomiting which often occurs during pregnancy.

ASTRINGENT.

℞ *Catechu extracti* ʒii.
Cinnamomi aquæ f℥viii.
Opii tincturæ ♏ix.
Fiat mistura, cujus sumantur cochlearia tria magna post singulas dejectiones liquidas.
In the last stage of diarrhœa, or dysentery.

EMETIC.

℞ *Antimonii potassio-tartratis* gr. viii.
Aquæ distillatæ f℥vi.
Mori syrupi fʒi.
Fiat mistura, cujus cochleare magnum quarta quaque hora sumendum.

℞ *Ipecacuanhæ pulveris* ʒss.
Antimonii potassio-tartratis gr. i.
Scillæ tincturâe fʒi.
Aquæ distillatæ f℥viiss.
Fiat mistura emetica, cujus sumat quamprimum cochlearia majora quatuor, et cochlearia duo sexta quaque parte horæ donec supervenerit vomitus.
In dropsies, before exhibiting the foxglove.

CATHARTIC.

℞ *Potassæ Sulphatis* ʒii.
Aquæ fontanæ f℥vss.
Jalapæ tincturæ fʒiv.
Sit mistura, cujus sumat cochlearia duo magna omni bihorio.

EXPECTORANT.

℞ *Amygdalæ misturæ* f℥v.
Ipecacuanhæ vini,
Scillæ tincturæ āā fʒi.
Tolutani syrupi fʒvi. *Misce.*

Sumat cochleare magnum urgente tussi.

In humoral asthma, and the latter stage of catarrh.

DEMULCENT.

℞ *Decocti Althææ officinalis* f℥vi.
Syrupi f℥i.
Fiat mistura, cujus sumatur tertia pars sexta quaque hora.

In calculous cases and inflammation of the kidneys.

DETERGENT GARGLE.

Potassæ Nitratis ʒii.
Rosæ mellis fʒiv.
Rosæ infusi f℥vss. *Misce.*
Fiat gargarysma sæpe utendum.

In inflammatory sore throat.

ASTRINGENT GARGLE.

℞ *Rosæ infusi* fvii.
Catechu tincturæ fʒvi.
Sulphurici Acidi diluti fʒi.
Opii tincturæ fʒiss.
Sit gargarysma sæpe utendum.

In relaxations of the uvula.

EXTERNAL APPLICATIONS.

LOTIONS.

℞ *Ammoniæ Hydrochloratis* ʒi.
Aquæ fontanæ f℥v.
Spiritus rectificati f℥i.
Misce, ut fiat lotio tumori applicanda.

In swelled testicle, and other inflammatory tumors.

℞ *Opii* ʒii.
Aceti distillati f℥vi.
Tere ut fiat lotio parti dolenti applicanda.

To painful actions of the joints, and in colic.

℞ *Zinci Sulphatis,*
Plumbi Acetatis, āā gr. x.
Rosæ aquæ,
Sambuci aquæ, āā f℥iii.
Fiat collyrium subinde utendum.

In ophthalmia, after local bleeding.

℞ *Plumbi Acetatis* gr. ix.
Rosæ aquæ f℥vss.
Aceti distillati fʒiii.
Spiritus rectificati fʒi.
Misce, ut fiat collyrium sæpe utendum.

In the acute stage of ophthalmia.

EMBROCATIONS.

STIMULANT.

℞ *Ammoniæ linimenti fortioris* fʒvi.
Olivæ olei fʒii.
Fiat embrocatio, cum panno laneo, faucibus externis applicanda.

In cynanche tonsillaris.

STIMULANT AND ANODYNE.

℞ *Camphoræ linimenti comp.* fʒix.
Cantharidis tincturæ fʒi.
Opii tincturæ fʒii.
Parti dolenti applicandum.

To be rubbed over the bowels in colic, cramp, and in painful affections of the joints.

POWDERS.

℞ *Acaciæ Gummi pulveris* ℥ss.
Aluminis gr. v.
Misce diligentissime, ut fiat pulvis, cujus inspergatur pauxillum super mamillas pro re nata.

In sore nipples to be applied after suckling.
℞ *Plumbi Acetatis*, ʒi.
Cinchonæ pulveris ʒvii.
Tere, ut fiat pulvis, cujus pauxillum super ulceres omni mane spergatur.
For scrofulous ulcers.

OINTMENTS.

℞ *Hydrargyri nitrico-oxydi* ℈ii.
Adipis ℥i.
Tere diligenter in mortario, donec bene misceantur.
In ulcerations of the eyelids.

℞ *Zinci oxydi* ℈i.
Adipis ℥i.
Tere optime in mortario, ut fiat unguentum.

No. VI.

A TABLE OF PHARMACEUTICAL EQUIVALENTS.

ACID, Acetic (anhydrous)	4 Carbon	(6·12 × 4) =	24·48	51·48
	3 Oxygen	(8 × 3) =	24	
	3 Hydrogen	=	3	
——— (crystallized or glacial)	1 Dry Acid	=	51·48	60·48
	1 Water	=	9	
—— Arsenious (dry)	2 Arsenic	=	75·4	99·4
	3 Oxygen	=	24	
—— Benzoic (dry)	14 Carbon	(6·12 × 14) =	85·68	114·68
	3 Oxygen	(8 × 3) =	24	
	5 Hydrogen	=	5	
—— Boracic (dry)	1 Boron	=	10·9	34·9
	3 Oxygen	(8 × 3) =	24	
——— (crystallized)	1 Dry Acid	=	34·9	52·9
	2 Water	(9 × 2) =	18	
—— Carbonic (dry)	1 Carbon	=	6·12	22·12
	2 Oxygen	(8 × 2) =	16	
—— Citric (dry)	4 Carbon	(6·12 × 4) =	24·48	58·48
	4 Oxygen	(8 × 4) =	32	
	2 Hydrogen	=	2	
——— (crystallized)	1 Dry Acid	=	58·48	76·48
	2 Water	(9 × 2) =	18	
—— Gallic	7 Carbon	=	42·84	85·84
	3 Hydrogen	=	3	
	5 Oxygen	=	40	
—— Hydriodic (dry)	1 Iodine	=	126·3	127·3
	1 Hydrogen	=	1	
—— Hydrocyanic (dry)	1 Cyanogen	=	26·39	27·39
	1 Hydrogen	=	1	
—— Hydrochloric (dry)	1 Chlorine	=	35·42	36·42
	1 Hydrogen	=	1	
—— Nitric (dry)	1 Nitrogen	=	14·15	54·15
	5 Oxygen	(8 × 5) =	40	
——— (liquid, sp. gr. 1·5)	1 Dry Acid	=	54·15	72·15
	2 Water	(9 × 2) =	18	
—— Oxalic (dry)	2 Carbon	(6·12 × 2) =	12·24	36·24
	3 Oxygen	(8 × 3) =	24	
——— (crystallized)	1 Dry Acid	=	36·24	63·24
	3 Water	(9 × 3) =	27	

Acid, Phosphoric (dry) -	2 Phosphorus - -		= 31.4	71·4
	5 Oxygen - -		= 40	
—— Succinic (dry, or anhydrous crystals) -	4 Carbon - -	(6·12 × 4)	= 24·48	50·48
	3 Oxygen - -	(8 × 3)	= 24	
	2 Hydrogen - -		= 2	
—— Sulphuric (dry) -	1 Sulphur - - -		= 16·1	40·1
	3 Oxygen - -	(8 × 3)	= 24	
———— (liquid, sp. gr. 1·48)	1 Dry Acid - - -		= 40·1	49·1
	1 Water - - -		= 9	
—— Tartaric (dry) -	4 Carbon -	(6·12 × 4)	= 24·48	66·48
	5 Oxygen - -	(8 × 5)	= 40	
	2 Hydrogen -		= 2	
———— (crystallized)	1 Dry Acid - -		= 66·48	75·48
	1 Water - -		= 9	
———— Tannic -	18 Carbon - -		= 110·16	215·16
	9 Hydrogen - -		= 9	
	12 Oxygen -		= 96	
Alum (dry) - -	3 Tersulphate of Alumina		= 171·7	258·95
	1 Sulphate of Potassa -		= 87·25	
—— (crystallized) -	1 Dry Alum - -		= 258·95	474·95
	24 Water - -	(9 × 24)	= 216	
Alumina - -	2 Aluminium - -		= 26·4	51·4
	3 Oxygen - -		= 24	
———— Sulphate (dry) -	1 Alumina - -		= 25·7	65·8
	1 Sulphuric Acid -		= 40·1	
Ammonia - -	1 Nitrogen - -		= 14·15	17·15
	3 Hydrogen - -		= 3	
———— Acetate (dry) -	1 Ammonia - -		= 17·15	68·63
	1 Acetic Acid - -		= 51·48	
———— Hydrated Bicarbonate - -	1 Ammonia - -		= 17	79·24
	2 Carbonic Acid	(22·12 × 2)	= 44·24	
	2 Water -	(9 × 2)	= 13	
———— Carbonate -	1 Ammonia - -		= 17·15	39·27
	1 Carbonic Acid -		= 22·12	
———— Hydrated Sesquicarbonate - -	$1\frac{1}{2}$ Ammonia - -		= 25·27	65·39
	1 Carbonic Acid -		= 22·12	
	2 Water - -	(9 × 2)	= 18	
———— Citrate (dry) -	1 Ammonia - -		= 17·15	75·63
	1 Citric Acid -		= 58·48	
———— Hydrochlorate	1 Ammonia - -		= 17·15	53·57
	1 Hydrochloric Acid -		= 36·42	
———— Sulphate (hydrated) - -	1 Ammonia - -		= 17·15	66·25
	1 Sulphuric Acid -		= 40·1	
	1 Water - -		= 9	
Antimony - -	- - -		-	- 64·6
———— Chloride - -	1 Antimony -		= 64·6	100·02
	1 Chlorine - -		= 35·42	
———— Sesquioxide -	2 Antimony -		= 125·2	153·2
	3 Oxygen - -		= 24	
———— Oxysulphuret of	2 Sesquioxide of Antimony		= 153·2	508·2
	2 Sesquisulphuret -		= 355	
———— Peroxide -	1 Antimony - -		= 64·6	80·6
	2 Oxygen -	(8 × 2)	= 16	
———— Sulphuret -	1 Antimony - -		= 64·6	88·6
	$1\frac{1}{2}$ Sulphur - -		= 24·1	
———— Potassio-Tartrate	1 Tartrate of Potassa -		= 113·63	351·31
	1 Tartrate of Antimony		= 219·68	
	2 Water - -		= 18	
Arsenic - -	- - -		-	- 37·7
——— Per-Iodide -	2 Arsenic - -		= 75·4	706·9
	5 Iodine - -		= 631·5	
Barium (Ba.) - -	- - -		-	- 68·7

Barium, Chloride of (Ba. Ch.)	1 Chlorine	= 35·42	122·12
	1 Barium	= 68·7	
	2 Water	= 18	
Baryta (Ḃa.)	1 Barium	= 68·7	76·7
	1 Oxygen	= 8	
Bismuth			71
Bismuth, Oxide of	1 Bismuth	= 71	79
	1 Oxygen	= 8	
—— Subnitrate	2 Oxide of Bismuth	(79 x 2) = 158	212·15
	1 Nitric Acid	= 54·15	
Boron			9·10
Brome			78·4
Brucia			275·99
Calcium			20·5
—— Chloride	1 Calcium	= 20·5	55·92
	1 Chlorine	= 35·42	
—— Oxide (see *Lime*).			
Carbon			6·12
Carburet of Nitrogen (Cyanogen)	2 Carbon	(6·12 x 2) = 12·24	26·39
	1 Nitrogen	= 14·15	
Chlorine			35·42
Cinchonia			156·55
Copper			31·6
—— Acetate of Peroxide (dry)	1 Oxide of Copper	= 39·6	91·14
	1 Acetic Acid	= 51·54	
—— —— (crystallized, common verdigris)	1 Acetate	= 91·14	100·14
	1 Water	= 9	
—— Binacetate (dry)	1 Oxide of Copper	= 91·14	193·1
	2 Acetic Acid	(51·48 x 2) = 102·96	
—— —— (crystallized or distilled verdigris)	1 Acetate	193·8	220·8
	3 Water	(9 x 3) = 27	
—— Oxide	1 Copper	= 31·6	39·6
	1 Oxygen	= 8	
—— Sulphate	Oxide of Copper	= 39·6	79·7
	Sulphuric Acid	= 40·1	
—— Bisulphate (dry)	1 Oxide of Copper	= 39·6	119·8
	2 Sulphuric Acid	(40 x 2) = 80·2	
—— —— (crystallized)	1 Bisulphate of Copper	= 119·8	209·8
	10 Water	(9 x 10) = 90	
Emetine	Carbon	= 64·37	In 100 parts.
	Hydrogen	= 7·77	
	Nitrogen	= 4·86	
	Oxygen	= 23	
Æther			37·48
Hydrogen			1
Iodine			126·3
—— sulphuret of	1 Iodine	= 126·3	142·3
	1 Sulphur	= 16	
Iron			28
—— Protoxide	1 Iron	= 28	36
	1 Oxygen	= 8	
—— Peroxide	1 Iron	= 28	40
	1½ Oxygen	= 12	
—— Bromide	1 Iron	= 28	106·4
	1 Brome	= 78·4	
—— Chloride	1 Iron	= 28	63·42
	1 Chlorine	= 35·42	
—— Iodide	1 Iron	= 28	154·3
	1 Iodine	= 126·3	
—— Sulphate (dry)	1 Protoxide of Iron	= 36	76
	1 Sulphuric Acid	= 40·1	
—— —— (crystallized)	1 Dry Sulphate	= 76·1	130·1
	6 Water	(9 x 6) = 54	

Lead				103·6
—— Acetate (dry)	1 Protoxide of Lead		=111·6	160·14
	1 Acetic Acid		= 51·54	
—————— (crystallized)	1 Dry Acetate		=163·14	190·14
	3 Water	(9 x 3)	= 27	
—— Chloride	1 Lead		=103·6	139·02
	1 Chlorine		= 35·42	
—— Iodide	1 Lead		=103·6	229·9
	1 Iodine		=126·3	
—— Diacetate	2 Protoxide of Lead	(111·6 x 2)	=223·12	274·66
	1 Acetic Acid		=51·54	
—— Protoxide	1 Lead		=103·6	111·6
	1 Oxygen		= 8	
—— Carbonate	1 Protoxide of Lead		=111·6	133·72
	1 Carbonic Acid		= 22·12	
Lime	1 Calcium		= 20·5	28·5
	1 Oxygen		= 8	
—— Carbonate	1 Lime		= 28·5	50·62
	1 Carbonic Acid		= 22·12	
—— Chloride	1 Lime		= 28·5	63·92
	1 Chlorine		= 35·42	
—— Hydrate (slaked lime)	1 Lime		= 28·5	63·92
	1 Water		= 9	
—— Hydrochlorate	1 Chloride of Calcium		= 55·92	99·92
	6 Water		= 54	
—— Phosphate	1 Lime		= 28·5	88·9
	1 Phosphoric Acid		= 55·4	
—— Sulphate (dry)	1 Lime		= 28·5	108·7
	2 Sulphuric Acid		= 80·2	
—— Tartrate (dry)	1 Lime		= 28·5	94·98
	1 Tartaric Acid		= 66·48	
Magnesia (Mg.)	1 Magnesium		= 12·7	20·7
	1 Oxygen		= 8	
———— Carbonate (dry)	1 Magnesia		= 20·7	42·82
	1 Carbonic Acid		= 22·12	
———— Sulphate (dry)	1 Magnesia		= 20·7	60·8
	1 Sulphuric Acid		= 40·1	
———————— (crystallized)	1 Dry Sulphate		= 60·8	123·8
	7 Water		= 63	
Mercury				202
——— Iodide	1 Mercury		=202	328·3
	1 Iodine		=126·3	
——— Biniodide	1 Mercury		=202	454·6
	2 Iodine		=252·6	
——— Protoxide	1 Mercury		=202	210
	1 Oxygen		= 8	
——— Binoxide	1 Mercury		=202	218
	2 Oxygen	(8 x 2)	= 16	
——— Chloride (Calomel)	1 Mercury		=202	237·42
	1 Chlorine		= 35·42	
——— Bichloride (Corrosive Sublimate)	1 Mercury		=202	272·84
	2 Chlorine	(35·42 x 2)	= 70·84	
——— Protosulphate (dry)	1 Protoxide of Mercury		=210	250·1
	1 Sulphuric Acid		= 40·1	
——— Persulphate (dry)	1 Peroxide of Mercury		=218	298·2
	2 Sulphuric Acid	(40·1 x 2)	= 80·2	
——— Protosulphuret	1 Mercury		=202	218·1
	1 Sulphur		= 16·1	
——— Bisulphuret	1 Mercury		=202	234·2
	2 Sulphur	(16 x 2)	= 32·2	
——— Bicyanide	1 Mercury		=202	254·78
	2 Cyanogen	(26 x 2)	= 52·78	

Mercury Protonitrate (dry) - -	1 Protoxide of Mercury -	=210	264·15
	1 Nitric Acid - -	= 54·15	
——— Pernitrate -	1 Peroxide of Mercury -	=218	326·30
	2 Nitric Acid - (64 x 2)	=108·30	
Morphia -	- - - -		288·23
——— Acetate of -	1 Morphia - -	=288·23	393·71
	1 Acetic Acid - -	= 51·48	
	6 Water - -	= 54	
——— Hydrochlorate of	1 Morphia - -	=288·23	378·65
	1 Hydrochloric Acid -	= 36·42	
	6 Water - - -	= 54	
Naphtha - -	5 Hydrogen - - -	= 5	41·72
	6 Carbon - - -	= 36·72	
Narcotine - -	Carbon - - -	= 65	In 100 parts.
	Hydrogen - -	= 5·5	
	Nitrogen - - -	= 2·51	
	Oxygen - - -	= 26·99	
Nitrogen - -	- - - - -		14·15
Oxygen -	- - - - -		9
Phosphorus -	- - - - -		15·7
Potassa (dry) - -	1 Potassium - - -	= 39·15	47·15
	1 Oxygen - -	= 8	
——— (hydrate) -	1 Dry Potassa - -	= 47·15	56·15
	1 Water - -	= 9	
——— Acetate (dry) -	1 Potassa - -	= 47·15	98·63
	1 Acetic Acid - -	= 51·48	
——— Arseniate (dry)	1 Potassa - -	= 47·15	104·85
	1 Arsenic Acid - -	= 57·7	
——— Arsenite (dry)	1 Potassa - -	= 47·15	96·85
	1 Arsenious Acid - -	= 49·7	
——— Bicarbonate (dry)	1 Potassa - -	= 47·15	91·63
	2 Carbonic Acid (22·24 x 2)	= 44·48	
——— ——— (crystallized) - -	1 Dry Bicarbonate - -	= 91·63	100·63
	1 Water - - -	= 9	
——— Bisulphate (dry)	1 Potassa - -	= 47·15	127·35
	2 Sulphuric Acid (40 x 2)	= 80·2	
——— ——— (crystallized) - -	1 Dry Bisulphate -	=127·35	145·35
	2 Water - (9 x 2)	= 18	
——— Bitartrate (dry)	1 Potassa - -	= 47·15	180·11
	2 Tartaric Acid (66·48 x 2)	=132·96	
——— Bitartrate (crystallized) - -	1 Dry Bitartrate - -	=180	198·11
	2 Water - - -	= 18·11	
——— Carbonate (dry)	1 Potassa - -	= 47·15	69·39
	1 Carbonic Acid - -	= 22·24	
——— Citrate (dry)	1 Potassa - -	= 47·15	105·63
	1 Citric Acid - -	= 58·48	
——— Nitrate - -	1 Potassa - -	= 47·15	101·30
	1 Nitric Acid -	= 54·15	
——— Sulphate -	1 Potassa - -	= 47·15	87·25
	1 Sulphuric Acid - -	= 40·1	
——— Tartrate (dry)	1 Potassa - -	= 47·15	113·63
	1 Tartaric Acid - -	= 66 48	
Potassium -	- - - -		39·15
——— Bromide -	1 Brome - -	= 78·4	165·45
	1 Potassium - -	= 39·25	
——— Cyanide -	1 Cyanogen - - -	= 26·39	65·54
	1 Potassium - - -	= 39·15	
——— Iodide -	1 Iodine - -	= 26·3	65·45
	1 Potassium - - -	= 39·15	
——— Chloride -	1 Potassium - - -	= 39·15	74·57
	1 Chlorine - -	= 35·42	

Potassium, Sulphuret	1 Potassium		= 39·15	55·25
	1 Sulphur		= 16·1	
—— Bisulphuret	1 Potassium		= 39·15	71·35
	2 Sulphur	(16·1 × 2)	= 32·2	
Quina				164·55
Silver				108
—— Oxide	1 Silver		= 108	116
	1 Oxygen		= 8	
—— Chloride	1 Silver		= 108	143·42
	1 Chlorine		= 35·42	
—— Nitrate of	1 Oxide of Silver		= 116	170·15
	1 Nitric Acid		= 54·15	
Soda dry	1 Sodium		= 23·3	31·3
	1 Oxygen		= 8	
—— Hydrated	1 Dry Soda		= 31·3	40·3
	1 Water		= 9	
—— Acetate (dry)	1 Soda		= 31·3	82·78
	1 Acetic Acid		= 51·48	
—— (crystallized)	1 Dry Acetate		= 82·78	136·78
	6 Water	(9 × 6)	= 54	
—— Biborate	1 Soda		= 31·3	97·50
	2 Boracic Acid		= 66·20	
—— Carbonate (dry)	1 Soda		= 31·3	53·42
	1 Carbonic Acid		= 22·12	
—— (crystallized)	1 Dry Carbonate		= 53·42	143·42
	10 Water	(9 × 10)	= 90	
—— Citrate (dry)	1 Soda		= 31·3	89·78
	1 Citric Acid		= 58·48	
—— Sulphate (dry)	1 Soda		= 31·3	71·3
	1 Sulphuric Acid		= 40·1	
—— (crystallized)	1 Dry Sulphate		= 71·4	161·4
	10 Water	(9 × 10)	= 90	
—— Tartrate (dry)	1 Soda		= 31·3	97·78
	1 Tartaric Acid		= 66·48	
—— Potassio-tartrate of	1 Soda		= 31·3	211·41
	1 Potassa		= 47·15	
	2 Tartaric Acid	(66·48 × 2)	= 132·96	
—— Hydrated Sesquicarbonate	2 Soda	(31·3 × 2)	= 62·6	164·36
	3 Carbonic Acid	(22·12 × 3)	= 66·36	
	4 Water	(9 × 4)	= 36	
—— Bicarbonate	1 Soda		= 31·3	84·54
	2 Carbonic Acid	(22·12 × 2)	= 44·24	
	1 Water		= 9	
Sodium				23·3
—— Chloride (common salt)	1 Sodium		= 23·3	58·72
	1 Chlorine		= 35·42	
—— Oxide (Soda)	1 Sodium		= 23·3	31·3
	1 Oxygen		= 8	
Strychnia				237·75
Sulphur				16·1
Sulphuretted Hydrogen	1 Sulphur		= 16·1	17·1
	1 Hydrogen		= 1	
Tin				57·9
Veratria				292·23
Water	1 Oxygen		= 8	9
	1 Hydrogen		= 1	
Zinc				32·3
—— Oxide	1 Zinc		= 32·3	40·3
	1 Oxygen		= 8	
—— Carbonate	1 Oxide of Zinc		= 40·3	62·42
	1 Carbonic Acid		= 22·12	

—— Iodide - -	1 Zinc - -	= 32·3	158·6
	1 Iodine - -	=126·3	
—— Sulphate (dry) -	1 Oxide of Zinc -	= 40·3	80·4
	1 Sulphuric Acid -	= 40·1	
———— (crystallized) - -	1 Dry Sulphate -	= 80·4	143·4
	7 Water -	(9 × 7)= 63	

No. VII.

POSOLOGICAL TABLE.

Absinthium ℈j. to ʒj.
Acaciæ gummi ℈j. to ʒiij.
Acetosella folia *ad libit.*
Acetum fʒij. to fʒx.
—— colchici fʒss. to fʒj.
—— scillæ ♏ xx. to fʒj.
Acidum benzoicum grs. v. to ℈j.
—— citricum grs. x. to ʒss.
—— hydrochlorium ♏v. to ♏xx.
—— dilutum ♏xv. to fʒi.
—— hydrocyanicum dilutum ♏iij. to ♏ viij.
—— nitricum dilutum ♏v. to ♏xl.
—— phosphoricum dilutum ♏xx. to fʒj.
—— tartaricum ♏x. to ʒss.
Aconiti folia gr. i. to grs. v.
Aconitina gr. $\frac{1}{8}$ to gr. ss.
Ærugo gr. $\frac{1}{10}$ to gr. i.
Æther sulphuricus ♏xx. to fʒij.
Aloes extractum grs. iij. to grs. xv.
Alumen grs. x. to ℈i.
Ammoniæ sesquicarbonas grs. x. to grs. xv.
—— hydrochloras grs. v. to j.
Ammoniacum grs. x. to ʒss.
Anethi semina grs. x. to ʒj.
Anisi semina grs. x. to ʒj.
Anthemidis flores grs. x. to ʒss.
Antimonii oxysulphuretum gr. i. to grs. v.
—— sesqui sulphuretum grs. x. to ʒss.
Antimonii potassio-tartras gr. i. to ʒss.
Aqua anethi f℥j. to f℥ij.
—— carui f℥j to f℥ij.
—— cinnamomi f℥j. to f℥ij.
—— fœniculi f℥j. to f℥ij.
—— menthæ piperitæ f℥j. to f℥ij.
—— menthæ viridis f℥j. to f℥ij.
—— pimentæ f℥j. to f℥ij.
—— pulegii f℥j. to f℥ij.
Argenti nitras gr. $\frac{1}{8}$ to grs. ij.
Armoraciæ radix ℈i. to ʒj.
Arseniosum acidum gr. $\frac{1}{10}$ to gr. j.
Asari folia grs. x. to ℈j.
Assafœtida grs. x. to ʒss.
Aurantii baccæ, cortex grs. x. to ℈j.
Balsamum peruvianum grs. x. to ℥ss.
—— tolutanum grs. x. to ʒss.
Belladonnæ folia gr. i. to grs. v.
Benzoinum grs. x. to ʒss.
Bismuthi trisnitras grs. v. to grs. xv.
Bistortæ radix grs. x. to ʒj.
Cajuputi oleum ♏j. to ♏v.
Calami radix grs. x. to ʒss.
Calumba grs. x. to ʒss.
Calcii chloridum gr. i. to grs v.
Cambogia grs. ij. to grs. x.
Camphora grs. iv. to ℈i.
Canellæ cortex grs. x. to ʒss.
Cantharis gr. ss. to grs. ij.
Capsici baccæ grs. v. to grs. x.
Carbo ligni grs. x. to ʒss.
Cardamines flores grs. x. to ʒj.
Cardamomi semina grs. v. to ʒss.
Carui semina grs. v. to ʒss.
Caryophylli grs. v. to ʒss.
—— oleum ♏j. to ♏v.
Cascarillæ cortex grs. x. to ʒi.
Cassiæ pulpa ʒss. to ℥j.
Castoreum grs. v. to ℈j.
Catechu grs. x. to ℈ij.
Centaurii cacumina grs. x. to ʒj.
Cetaceum ℈j. to ʒss.
Cinchonæ cordifoliæ cortex grs. x. to ʒij.
—— lancifoliæ cortex grs. x. to ʒij.
—— oblongifoliæ cortex grs. x. to ʒij.
Cinnamomi cortex grs. v. to ℈j.
—— oleum ♏i. to ♏ii.
Coccus gr. i. to ℈i.
Colchici cormus grs. ij. to ℈ss.
—— semina gr. i. to grs. v.

Colocynthidis pulpa gr. i. to grs. v.
Confectio amygdalarum ʒj. to ʒij.
—— aromatica ℈ss. to ʒj.
—— aurantiorum ʒj. to ℥j.
—— cassiæ ʒij. to ℥j.
—— opii ℈j. to ʒiv.
—— piperis nigri grs. x. to ʒj.
—— rosæ caninæ ʒj. to ʒij.
—— rosæ gallicæ ʒj. to ʒij.
—— rutæ ʒss. to ʒj.
—— scammoniæ ℈j. to ʒj.
—— sennæ ʒij. to ʒvj.
Conii folia grs. v. to ℈j.
Contrayervæ radix grs. x. to ℈ij.
Copaiba ♏x. to fʒij.
Coriandri semina ℈j. to ʒj.
Creta præparata grs. xv. to ʒij.
Croci stigmata gr. x. to ʒj.
Cubeba grs. x. to ʒij.
Cupri ammonio-sulphas gr. $\frac{1}{4}$ to gr. j.
Cupri sulphas gr. $\frac{1}{6}$ to gr. j.
Cuspariæ cortex grs. x. to ʒj.
Dauci radix, semina ℈j. to ʒj.
Decoctum aloes compositum fʒiv. to f℥ij.
—— cetrariæ f℥j. to f℥ij.
—— chimaphilæ f℥j. to f℥ij.
—— cinchonæ f℥j. to f℥ij.
—— cydoniæ f℥i. to f℥ij.
—— dulcamaræ fʒiv. to f℥ij.
—— hordei *ad libitum.*
—— hordei compositum *ad libitum.*
—— malvæ compositum *ad libitum.*
—— quercus fʒij. to f℥i.
—— sarzæ f℥iv. to f℥viij.
—— sarzæ compositum f℥iv. to f℥viij.
—— scoparii compositum f℥j. to f℥ij.
—— senegæ f℥iss. to f℥iij.
—— tormentillæ f℥j. to f℥iss.
—— ulmi f℥iv. to f℥viij.
Digitalis folia gr. ss. to grs. iij.
Elaterii pepones gr. $\frac{1}{10}$ to grs. ss.
Extractum aconiti gr. ss. to gr. v.
—— aloes purificatum grs. vj. to grs. x.
—— anthemidis grs. v. to ℈j.
—— belladonnæ gr. ss. to grs. ij.
—— cinchonæ gr. x. to ʒss.
—— cinchonæ resinosum grs. v. to ʒss.
—— colchici aceticum gr. i. to grs. v.
—— colchici cormi gr. i. to grs. v.
—— colocynthidis grs. v. to ℈j.
—— colocynthidis compositum grs. v. to ℈j.
—— conii grs. iij. to grs. xx.
—— gentianæ grs. x. to ℥ss.
—— glycyrrhizæ grs. x. to ʒj.
—— hæmatoxyli grs. x. to ʒj.
—— lupuli grs. v. to ℈j.
—— hyoscyami grs. v. to ℈j.
—— jalapæ grs. x. to ℈j.
—— opii, gr. j. to grs. v.
—— papaveris, grs. iij. to grs. xij.
Extractum rhei grs. x. to ℈j.
—— sarzæ grs. v. to ʒj.
—— taraxaci grs. x. to ʒj.
—— uvæ ursi grs. v. to ℈j.
Ferri ammonio-chloridum grs. iij. to ℈j.
—— ramenta et fila grs. v. to ℈j.
—— sesquioxydi grs. x. to ʒiij.
—— sulphas grs. ij. to grs. v.
—— potassio-tartras grs. v. to ℈j.
Fœniculi semina grs. x. to ʒss.
Galbani gumma resina grs. x. to ʒss.
Gallæ grs. x. to ℈j.
Gentianæ radix grs. x. to ʒss.
Granati cortex ℈j. to ʒj.
Guaiaci resina et lignum, grs. x. to ʒss.
Hydrargyri binoxydum grs. ss. to grs. ij.
—— oxydum cinereum grs. v. to ℈ss.
—— oxydum gr. j. to grs. v.
—— bichloridum gr. $\frac{1}{6}$ to gr. i.
—— chloridum gr. ss. to grs. x.
—— sulphuretum cum sulphure grs. x. to ʒss.
Hydrargyrum cum creta grs. v. to ℈j.
Hyosciami folia et semina grs. v. to grs. x.
Infusum anthemidis f℥j. to f℥ij.
—— armoraciæ compositum f℥j. to f℥ij.
—— aurantii compositum f℥j. to f℥ij.
—— calumbæ f℥j. to f℥ij.
—— caryophylli f℥i. to f℥ij.
—— cascarillæ f℥jss. to f℥ij.
—— catechu compositum f℥j. to f℥iij.
—— cinchonæ f℥j. to f℥ij.
—— cuspariæ f℥j. to f℥ij.
—— digitalis fʒj. to fʒvi.
—— gentianæ compositum f℥jss. to f℥ij.
—— lini *ad libitum.*
—— quassiæ f℥jss. to f℥ij.
—— rhei f℥j. to f℥ij.
—— rosæ compositum f℥j. to f℥ij.
—— scoparii f℥j. to f℥ij.
—— serpentariæ f℥j. to f℥ij.
—— sennæ compositum f℥ij. to f℥ij.
—— simarubæ f℥j. to f℥ij.
—— tabaci ♏x. to ♏xx.
—— valerianæ f℥j. to f℥ij.
Iodinii gr. $\frac{1}{8}$ to grs. iv.
Ipecacuanhæ radix gr. ss. to grs. xxx.
Jalapæ radix grs. x. to ℈j.
Kino grs. x. ʒss.
Krameriæ radix grs. x. to ʒss.
Lavandulæ flores grs. x. to ʒj.
Lauri baccæ et folia grs. x. to ʒss.
Lichen ℈j. to ʒj.
Liquor ammoniæ ♏x. to ♏xxx.
—— ammoniæ acetatis fʒiv. to f℥j.
—— ammoniæ sesquicarbonatis fʒss. to fʒj.
—— calcis f℥j. to f℥iv.
—— chloridi calcii ♏xv. to fʒij.
—— hydrargyri bichloridi ♏x. to fʒj.
—— plumbi diacetatis ♏iij. to ♏x.

Liquor potassæ ♏x. to fʒij.
—— potassæ sesquicarbonatis ♏x. to fʒij.
———— arsenitis ♏v. to fʒj.
—— potassii iodidi comp. ♏xx. to fʒiij.
Magnesia ℈j. to ʒj.
—— carbonas ʒss. to ʒij.
—— sulphas ʒss. to ℥j.
Malva ℈j. to ʒj.
Manna ʒiv. to ℥ij.
Marrubium ℈j. to ʒj.
Mastiche grs. x. to ʒss.
Mentha piperita grs. x. to ʒj.
—— viridis grs. x. to ʒj.
Menyanthes ʒss. to ʒj.
Mezerei cortex gr. i. to grs. x.
Mistura ammoniaci fʒiij. to f℥j.
—— amygdalarum f℥ij. to f℥iij.
—— assafœtidæ fʒiv. to f℥j.
—— camphoræ f℥j. to f℥iij.
—— cascarillæ compositæ f℥j. to f℥jss.
—— cretæ f℥j. f℥ij.
—— ferri composita fʒiv. to f℥j.
—— gentianæ composita f℥j. to f℥jss.
—— guaiaci f℥jss. to f℥ij.
—— moschi f℥j. to f℥ij.
Morphiæ acetas gr. $\frac{1}{4}$ to gr. j.
—— hydrochloras gr. $\frac{1}{4}$ to gr. j.
Moschus grs. ij. to ʒj.
Myristicæ nuclei grs. v. to grs. x.
Myrrha grs. x. to ʒss.
Oleum æthereum ♏j. to ♏v.
—— amygdalæ fʒij. to f℥j.
—— anisi ♏j. to ♏v.
—— anthemidis ♏j. to ♏v.
—— carui ♏i. to ♏v.
—— juniperi ♏j. to ♏v.
—— lavandulæ ♏j. to ♏v.
—— lini fʒiv. to f℥j.
—— menthæ piperitæ ♏j. to grs. v.
—— menthæ viridis ♏j. to ♏x.,
—— origani ♏j. to ♏v.
—— pimentæ ♏j. to ♏v.
—— pulegii ♏j. ♏v.
—— ricini fʒiv. f℥jss.
—— rosmarini ♏ij. to ♏x.
—— succini ♏v. ♏xv.
—— terebinthinæ rectificatum ♏v. to f℥j.
—— tiglii ♏j. ♏v.
Olibanum grs. x. to ʒss.
Olivæ oleum fʒiv. to ℥j.
Opium gr. ss. to grs. iv.
Opoponacis gummi resina grs. v. to ʒss.
Oxymel fʒss. to fʒij.
—— scillæ fʒss. to fʒij.
Petroleum grs. x. to ʒj.
Pilulæ aloes compositæ grs. v. to ℈j.
—— aloes cum myrrha grs. v. to ℈j.
Pilulæ conii comp. grs. iij. to grs. x.
—— ferri compositæ grs. x. to ℈j.
—— galbani compositæ grs. x. to ℈j.
Pilulæ hydrargyri gr. i. to grs. x.
—— cambogiæ grs. ij. to grs. iij.
—— hydrargyri chloridi comp. grs. v. to grs. x.
—— rhei comp. grs. x. to ʒss.
—— saponis cum opio grs. v. to grs. x.
—— scillæ compositæ grs. x. to ℈j.
Pimentæ baccæ grs. v. to ℈j.
Piperis longi fructus grs. v. to ℈j.
—— nigri baccæ gr. i. to ℈j.
Pix liquida grs. x. to ʒj.
Plumbi acetas gr. i. to grs. x.
—— iodidum gr. ss. to grs. ij.
Potassæ acetas grs x. to ʒj.
—— carbonas grs. x. to ʒss.
—— nitras grs. x. to ʒj.
—— bicarbonas grs. x. to ʒj.
—— sulphas grs. x. to ʒj.
—— sulphuretum grs. ij. to grs. vj.
—— bisulphas grs. xv. to ʒiij.
—— bitartras grs. x. to ʒj.
—— tartras ℈j. to ʒvj.
Pulvis aloes compositus grs. v. to grs. x.
—— antimonii comp. grs. v. to grs. x.
—— cinnamomi comp. grs. v. to grs. x.
—— cornu usti cum opio grs. v. to ℈j.
—— cretæ compositus grs. x. to ℈j.
—— cretæ compositus c. opio grs. x. to ℈j.
—— jalapæ compositus grs. xv. to ℈ij.
—— ipecacuanhæ compositus grs. v. to grs. x.
—— kino compositus grs. x. to ℈j.
—— scammonii compositus grs. v. to ℈j.
—— tragacanthæ compositus grs. x. to ʒj.
Quassiæ lignum grs. v. to ʒss.
Quercus cortex grs. x. to ʒss.
Quinæ disulphas gr. i. to grs. x.
Rhamni baccæ ℈j. to ʒij.
Rhei radix grs. x. to ʒss.
Ricini oleum fʒij. to f℥j.
Rosæ caninæ pulpa ℥j. to ℥ij.
—— centifoliæ petala ℈j. to ʒj.
—— gallicæ petala ℈j. to ʒj.
Rosmarini cacumnia grs. x. to ʒss.
Rutæ folia grs. x. to ℈ij.
Sabinæ folia grs. v. to grs. x.
Sagapenum grs. x. to ʒss.
Salicis cortex grs. xv. to ʒss.
Sapo durus grs. v. to ʒss.
Sarzæ radix ℈i. to ʒi.
Sassafras lignum et radix ℈j. to ʒj.
Scammonium grs. v. to ℈j.
Scillæ radix exsiccata gr. j. to grs. iv.
Senegæ radix ℈j: to ℈ij.
Sennæ folia ℈j. to ʒj.
Serpentariæ radix grs. x. to ʒss.
Simaroubæ cortex grs. x. to ʒss.
Sinapis semina grs. x. to ʒss.
—— (emetic) ʒij. to ʒiv.
Sodæ carbonas grs. x. to ʒss.

Sodæ sesquicarbonas grs. x. to ʒss.
—— carbonas exsiccata grs. v. to grs. xv.
—— bi-boras grs. x. to ʒss.
Sodii chloridum grs. x. to ʒj.
—— sulphas ʒiv. to ℥j.
Spartii cacumina grs. x. to ʒss.
Spigeliæ radix grs. x. to ℈ij.
Spiritus ætheris aromaticus ♏x. to fʒj.
—— ætheris nitrici ♏x. to fʒj.
—— ætheris sulphurici ♏x. to fʒj.
—— ætheris sulphurici compositus ♏xv. to fʒi.
—— ammoniæ aromaticus ♏x. to fʒj.
Spiritus ammoniæ fœtidus ♏x. to fʒj.
—— ammoniæ succinatus ♏x. to fʒj.
—— anisi fʒij. to fʒiv.
—— armoraciæ comp. fʒii. to fʒiv.
—— carui fʒij. to fʒiv.
—— cinnamomi fʒij. to fʒiv.
—— juniperi compositus fʒij. to f℥j.
—— lavandulæ ♏x. to fʒj.
—— lavandulæ compositus ♏xx. to fʒij.
—— menthæ piperitæ ♏xx. to fʒij.
—— menthæ viridis ♏xx. to fʒij.
—— myristicæ fʒj. to fʒij.
—— pimentæ fʒi. to fʒij.
—— pulegii fʒj. to fʒij.
—— rosmarini fʒj. to fʒij.
Spongia usta grs. x. to ʒss.
Strychnia gr. $\frac{1}{10}$ to gr. j.
Sulphur ℈j. to ʒj.
Syrupus fʒj. to f℥j.
—— altheæ fʒj. to fʒvj.
—— aurantiorum fʒj. to fʒiv.
—— croci fʒss. to fʒij.
—— limonum fʒi. to fʒiv.
—— mori fʒj. to fʒiv.
—— papaveris fʒj. to f℥j.
—— rhœados fʒj. to fʒij.
—— rhamni fʒj. to fʒvj.
—— rosæ fʒj. to f℥j.
—— sennæ fʒj. to f℥j.
—— tolutani fʒss. to fʒiv.
—— zingiberis fʒss. to fʒij.
Tabaci folia gr. ss. to grs. iv.
Tamarindi pulpa ʒiv. to ℥j.
Terebinthina canadensis ℈j. to ʒj.
—— chia ℈j. to ʒj.
—— vulgaris oleum fʒss. to f℥j.
Tinctura aloes fʒiv. to f℥j.
—— aloes composita fʒj. to fʒiv.
—— ammoniæ composita ♏v. to ♏xx.
—— assafœtidæ fʒss. to fʒij.
Tinctura aurantii fʒj. to fʒiv.
—— benzoini composita fʒss. to fʒij.
—— calumbæ fʒi. to fʒiv.
—— camphoræ composita fʒj. to fʒiv.
—— cantharidis ♏x. to fʒss.
—— capsici ♏x. to fʒss.
—— cardamomi fʒj. to fʒiv.
—— cardamomi composita fʒj. to fʒiv.
—— cascarillæ fʒj. to fʒiv.
—— castorei fʒj. to fʒiv.
—— catechu fʒj. to fʒiv.
—— cinchonæ fʒi. to fʒiv.
—— cinchonæ composita fʒj. to fʒiv.
—— cinnamomi fʒj. to fʒij.
—— cinnamomi composita fʒj. to fʒij.
—— conii fʒss. to fʒij.
—— digitalis ♏x. to ♏xl.
—— ferri ammonio-chloridi fʒj. to fʒij.
—— sesqui chloridi ♏x. to fʒj.
—— gentianæ composita fʒj. to fʒij.
—— guaiaci fʒj. to fʒiv.
—— guaiaci composita ♏xv. to fʒj.
—— hellebori ♏xx. to fʒj.
—— lupuli fʒss. to fʒij.
—— hyoscyami fʒss. to fʒij.
—— jalapæ fʒj. to fʒiij.
—— kino fʒj. to fʒij.
—— lavandulæ composita fʒj. to fʒij.
—— myrrhæ ♏xx. to fʒj.
—— opii ♏x. to fʒj.
—— rhei fʒj. to fʒiv.
—— rhei composita fʒj. to fʒiv.
—— scillæ ♏x. to fʒj.
—— sennæ fʒj. to fʒij.
—— serpentariæ fʒj. to fʒiv.
—— valerianæ fʒj. to fʒij.
—— valerianæ composita fʒss. to fʒj.
—— zingiberis grs. x. to fʒj.
Tormentillæ radix grs. x. to fʒss.
Tragacantha grs. x. to ʒj.
Ulmi cortex grs. x. to ʒj.
Uvæ ursi grs. x. to ℥j.
Valerianæ radix ℈j. to ʒij.
Veratria grs. to gr. ss. $\frac{1}{10}$
—— radix gr. ij. to grs. vj.
Vinum antimonii potassio-tartratis ♏xv. to fʒi.
—— (emetic) fʒj. to f℥ij.
—— aloes fʒiv. to f℥ij.
—— colchici ♏xv. to fʒj.
—— ipecacuanhæ ♏xx. to fʒj.
—— (emetic) fʒj. to f℥iss.
—— opii ♏x. to fʒj.
—— veratri ♏x. to grs. xx.
Zinci oxydum gr. j. to grs. x.
—— sulphas gr. j. to ʒss.
Zingiberis radix grs. v. to ʒss.

SUPPLEMENT.

VINEGARS.

Preparations of Vinegar.

ACETUM CANTHARIDIS, Lond. *Vinegar of Cantharidis.*

"Take of cantharides, rubbed to powder, *two ounces;* acetic acid, *a pint.* Macerate the cantharides with the acid for eight days, frequently shaking: lastly, press and strain."

For raising a sudden blister.

ACETUM COLCHICI, Lond. *Vinegar of Meadow Saffron.*

"Take of fresh meadow saffron, cormus, sliced, *an ounce;* distilled vinegar, *sixteen fluid ounces;* proof spirit, *a fluid ounce.* Macerate the meadow saffron cormus with the vinegar in a covered glass vessel, for three days; afterwards press and strain and set it by, that the dregs may subside: lastly, add the spirit to the clear liquor.

When dug up in July, the bulb contains that principle for which it is employed in the greatest perfection, and of which vinegar is a good solvent. This solution is now introduced as a better form of preserving the virtues of the remedy than the oxymel. It is given as a diuretic in ascites and hydrothorax; but it is less to be depended on than the squill. It should be prepared with the dried bulb, in which case the proportion should be six drachms to a pint of vinegar. It is employed in gout. The dose is from f ʒss. to f ʒj., united with any bland fluid.

ACETUM OPII, Dub. *Vinegar of Opium.*

"Take of Turkish opium, *four ounces;* distilled vinegar, *a pound.* Rub the opium into a pulp with a little of the vinegar, then add the remainder of the vinegar. Macerate the mixture in a stoppered bottle, shaking it frequently, for seven days. Pour off the supernatant solution; and, finally, filter."

This is an admirable addition to the preparations of opium of the British pharmacopœias. It contains an acetate of morphia, the most active form of the narcotic principle; and resembles closely the celebrated black drop. The dose is from ten drops to twenty.

ACETUM SCILLÆ, Lond. *Vinegar of Squill.*

"Take of fresh dried squill, *fifteen ounces;* distilled vinegar, *six pints;* proof spirit, *half a pint.* Macerate the squill in the vinegar with a gentle heat, in a covered vessel, for twenty-four hours; then express the liquor, and set it aside that the feculencies may subside; lastly, add the spirit to the clear liquor.

ACIDUM ACETICUM SCILLITICUM, Edin. *Vinegar of Squill.*

"Take of squill root (bulb), dried, *one ounce;* distilled vinegar, *fifteen ounces;* alcohol, *one ounce and a half.* Macerate the squill with the acid for seven days; then express the liquor, and add to it the alcohol; and when the feculencies have subsided, pour off the clear fluid."

ACETUM SCILLÆ, Dub. *Vinegar of Squill.*

"Take of fresh squill root (bulb), dried, *half a pound;* wine vinegar, *three pints;* rectified spirit, *four fluid ounces.* Digest the squill with the vinegar for four days in a glass vessel, with frequent agitation; then express the vinegar, and after the feculencies have subsided, add to it the spirit."

Syn. Vinaigre scillitique (*F.*), Meerzwiebelessig (*G.*).

Vinegar extracts and holds in solution the *scillitina*, the active principle of the squill, upon which its efficacy as a remedy depends. This preparation has long been used as an expectorant and diuretic in chronic catarrh, humoral asthma, and dropsies. The dose is from f ʒ ss. to f ʒ ij., given in cinnamon or mint water. In large doses it produces vomiting; and is occasionally used as an emetic in the above diseases, when the stomach is loaded.

When kept, the vinegar of squill deposits a precipitate, which consists of citrate of lime and tannin.[1]

Officinal preparations. — *Oxymel Scillæ*, L. *Syrupus Scillæ*, E.

MELLITA.

PREPARATIONS OF HONEY.

A MORE correct knowledge of the operation of those medicinal substances which have been named *balsamic* or *pectoral*, has set aside the high opinion which formerly prevailed of the efficacy of honey as a remedy in pulmonary diseases. It is, however, still employed in pharmacy, and has some advantages over syrup, particularly where it is to be employed as a local application; but, for internal purposes, its use is to a certain degree limited, owing to the unpleasant effects which it pro-

[1] Vogel. *Annales de Chimie*, vol. lxxxiii. p. 157.

duces on the bowels of some individuals. The Edinburgh College has altogether rejected this class of preparations, but a few of them are retained by the London and the Dublin Colleges. They are not apt to spoil, and, therefore, require less care to preserve them than the syrups.

MEL DESPUMATUM, Dub. *Clarified Honey.*

"Melt the honey in a water bath; then remove the scum."

Syn. Miel despumé (*F.*), Geschäumter Honig (*G.*), Mele Schiumato (*I.*).

By thus liquefying honey, the wax which it may have retained when expressed from the comb, rises to the surface; and at the same time any sand or other impurities, with which it may have been fraudulently mixed, fall to the bottom or rise with the wax, and are easily separated. The specific gravity of purified honey is 1·31. It is chiefly employed for forming the other preparations into which honey enters. It is less apt to gripe than the crude honey, owing, probably, to its being less liable to ferment. It is, undoubtedly, more agreeable to the taste and smell than crude honey.

Officinal preparations. — *Confectio Rutæ*, L. *Linimentum Æruginis*, L. *Mel Boracis*, L. *Mel Rosæ*, L. D. *Oxymel Colchici*, D. *Oxymel Scillæ*, L. D. *Oxymel*, L. D.

MEL BORACIS, Lond. Dub. *Honey of Borax.*

"Take of borax, powdered, *a drachm;* honey, *an ounce.* Mix them."

The biborate, in this preparation, undergoes a change, as well as the honey, and a preparation results which is not a simple solution of borax in honey. This change is not yet satisfactorily explained.

This is a cooling, detergent, useful application to the tongue and fauces in aphthous affections. Dissolved in water, it forms an excellent gargle for allaying the pain attending mercurial salivations.

MEL ROSÆ, Lond. *Rose Honey.* [1]

"Take of the petals of the red rose, dried, *four ounces;* boiling distilled water, *two pints and a half;* honey, *five pounds.* Macerate the petals in the water for six hours; then to the filtered liquor add the honey, and boil it down to a proper consistence by means of a water bath."

Dublin.

"Take of the petals of red rose-buds, dried and freed from their claws, *four ounces;* boiling water, *three pints;* honey, *five pounds.* Macerate the petals in the water for six hours; then mix the honey with the strained liquor, and boil the mixture to the consistence of a syrup, taking off the scum."

Syn. Miel rosat (*F.*), Rosenhonig (*G.*), Mele rosato (*I.*).

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[1] Mel rosarum, P. L. 1720. Mel rosaceum, P. L. 1745.

This honey has the pleasant flavour of the rose, and a slight degree of astringency. In making it, the clarified honey ordered by the London College is to be preferred. It is chiefly employed as an adjunct to detergent and astringent gargles.

OXYMEL [1], Lond. Dub. *Oxymel.*

"Take of honey, *ten pounds;* acetic acid, *one pint and a half.* Mix the acid with the honey made hot."

Syn. Oxymel (*F.*), Essighonig (*G.*), Ossimele (*I.*).

Simple oxymel in doses of f ʒ j. or more, dissolved in barley-water, forms a pleasant and cooling beverage in fevers and inflammatory affections; but in some individuals it has a griping quality like honey, which prevents it from being generally used in these affections. It is often added to gargles in cynanche tonsillaris, and is a common vehicle of other remedies in catarrhal complaints. The Dublin College orders it to be prepared with unclarified honey, skimming it during the boiling; but the London directions are to be preferred.

OXYMEL COLCHICI, Dub. *Oxymel of Meadow Saffron.*

"Take of the fresh root (bulb) of meadow saffron, cut into thin slices, *one ounce;* distilled vinegar, *a pint;* clarified honey, *two pints.* Digest the colchicum with the vinegar in a glass vessel for two days; then to the liquor strongly expressed from the root add the honey; and, lastly, boil down the mixture to the consistence of a syrup, frequently stirring it during the boiling with a wooden spoon."

This preparation is very uncertain in point of strength. It is given in humoral asthma, and in dropsies. The dose is f ʒ j. gradually increased to f ℥ j., given in a cupful of gruel, twice a day.

OXYMEL CUPRI SUBACETATIS, Dub. Vide *Linimentum Æruginis.*

OXYMEL SCILLÆ [2], Lond. Dub. *Oxymel of Squill.*

"Take of honey, *three pounds;* vinegar of squill, *one pint and a half.* Boil in a glass vessel, over a gentle fire, to a proper consistence."

Syn. Meerzwiebelhonig (*G.*).

Oxymel of squill is principally employed as an expectorant, and as such is very useful in humoral asthma, and chronic coughs, in doses of from f ʒ ss. to f ʒ ij. It is generally given in some aromatic distilled water, to prevent the nausea which it is apt to induce: in larger doses it is given to excite vomiting, and at the same time clear the chest, in hooping-cough.

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[1] Mel acetatum, P. L. 1787.

[2] Oxymel scilliticum, P. L. 1720, 1745.

When kept for a considerable, time, this oxymel lets fall a precipitate which has the aspect of crystallized honey. Vogel found it to consist of citrate of lime, tannin, and honey.[1]

TROCHES.

TROCHES and lozenges are powders mixed up with glutinous substances into little cakes, and afterwards dried. The lozenges of the confectioner are superior in elegance to those of the apothecary, thence the London and Dublin Colleges have properly ommitted them.

TROCHISCI CARBONATIS CALCIS, Edin. *Troches of Carbonate of Lime.*

"Take of carbonate of lime, prepared, *four ounces;* gum arabic, *one ounce;* nutmeg, *one drachm;* refined sugar, *six ounces.* Powder them together, and form them with water into a mass for making troches."

These are used against acidity of the stomach, when accompanied with diarrhœa.

TROCHISCI CARBONATIS MAGNESIÆ, Edin. *Troches of Carbonate of Magnesia.*

"Take of carbonate of magnesia, *six ounces;* refined sugar, *three ounces;* nutmeg, *one scruple.* Powder them, and make them into a mass for troches, with mucilage of tragacanth.

Troches of magnesia are also used for acidity of the stomach.

TROCHISCI GLYCYRRHIZÆ GLABRÆ, Edin. *Troches of Liquorice.*

"Take of extract of liquorice, gum arabic, each *one part;* refined sugar, *two parts.* Boiling water, a sufficient quantity. Dissolve and strain; then evaporate the solution over a gentle fire, till it be of a proper consistence for being formed into troches."

TROCHISCI GLYCYRRHIZÆ CUM OPIO, Edin. *Liquorice Troches with Opium.*

"Take of opium, *two drachms;* tincture of tolu, *half an ounce;* common syrup, *eight ounces;* extract of liquorice, softened with warm water, gum arabic, in powder, of each *five ounces.* Triturate the opium well with the tincture, then add by degrees the syrup and extract; afterwards gradually mix in the powdered gum arabic. Lastly, dry them so as to

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[1] *Annales de Chimie,* vol. lxxxiii. p. 157.

form a mass, to be divided into troches, each weighing ten grains.

Seven and a half of these troches contain about one grain of opium. They are useful in tickling coughs depending on irritation of the fauces.

TROCHISCI GUMMOSI, Edin. *Gum Troches.*

"Take of gum arabic, *four parts;* starch, *one part;* refined sugar, *twelve parts.* Powder them, and make them into a proper mass with rose-water, so as to form troches."

This is a very agreeable lozenge, calculated for allaying the tickling in the throat which provokes coughing.

TROCHISCI NITRATIS POTASSÆ, Edin. *Troches of Nitrate of Potass.*

"Take of nitrate of potassa, *one part;* double-refined sugar, *three parts.* Rub together to powder, and form them, with mucilage of gum tragacanth, into a mass, to be divided into troches.

This an agreeable form for the exhibition of nitre; but if the quantity taken be considerable, it is apt to occasion uneasiness in the stomach.

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[*The initial letters, placed after the names of articles, denote the Pharmacopœia in which they are found.*]

A.