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A

SYSTEM

OF

MATERIA MEDICA

AND

PHARMACY:

BY

J. MURRAY,

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WITH NOTES

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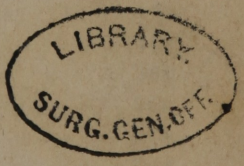
IN TWO VOLUMES.

VOL. II.



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District of Pennsylvania, to wit:

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D. CALDWELL,
Clerk of the District of Pennsylvania.

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PART III.

OF PHARMACY.

THE objects of Pharmacy are the Preservation, Preparation, and Composition of Medicines. In the state in which these are afforded by nature, they are not always best adapted to the treatment of disease: they are often liable to change from spontaneous decompositions, which require therefore to be counteracted: their powers sometime reside, not in the entire matter of which they consist, but in principles capable of being extracted, and which are employed with advantage in an insulated state, or under peculiar forms; by chemical combinations, remedies altogether new are obtained; and, lastly, medicines frequently require to be combined to fulfil particular indications, or they are rendered more pleasant, more safe, and even more active, when given in a state of mixture. Pharmacy, regarded as an art, prescribes the rules by which the operations for the attainment of these objects are conducted, and as a science unfolds the principles on which they depend.

The Preservation of Medicines is generally speaking the least important part of Pharmacy. Those which are most liable to decomposition are the vegetable products, many of which, especially when the re-action of their elements is favoured by humidity, suffer such changes as weaken their medicinal properties. Changes, productive of the same result, are not unfrequently occa-

sioned by the action of air and light. The methods by which these are counteracted, of which the most important is Exsiccation, belong to this division of pharmacy. It includes too the few general rules which are observed in collecting plants in that state of vigour and maturity in which they are possessed of the greatest degree of activity. And there belong to it also those operations which are necessary to preserve unaltered the few animal products employed in medicine.

Under the second branch of Pharmacy, the Preparation of Medicines, are included a number of important operations, agreeing in general in affording substances different, more or less in chemical constitution, from the substances operated on.

The medicinal powers of vegetable substances, it has already been remarked, frequently reside in peculiar proximate principles, which, from their relations to certain solvents, can be separated from each other; and thus, in many cases, the principle on which the medicinal activity of the substance depends, can be obtained in a pure and concentrated state. Resins, for example, are dissolved by alkohol, gums by water, extractive matter by either of these liquids, or by a mixture of both; and by this separation advantages are often obtained; the medicine is rendered more certain in its operation; it is more easily preserved, or more conveniently administered. On this are founded the various pharmaceutic preparations of infusions, decoctions, tinctures, medicated wines or vinegars, and extracts;—forms under which medicines are often employed in preference to their natural state.

The proximate principles of plants are sometimes obtained apart by other processes, as by distillation, or even by mechanical expression, whence other forms of preparation are obtained.

To this division belong too the Saline and Metallic Preparations. These are entirely the results of chemical processes; they are new remedies formed by chemical combination, and are possessed of properties altogether

different from those of the substances from which they are prepared.

In all these preparations, chemical changes are produced to a greater or less extent. Medicines are also, however, frequently given in a state of mixture, in which they either exert no mutual chemical action, or none producing any modification of their powers. This forms what is named Composition in Pharmacy. It is employed with different views; sometimes, for example, to conceal a medicine, to render it less unpleasant, or to give it a convenient form. And frequently more important advantages are attained; the action of one medicine on the system, or on a particular organ, so far co-operating with that of another, as to render its operation more certain, or more powerful, or even sometimes giving rise to such a modification, as to produce an effect different from that which would be obtained from the action of either.

Pharmacy, as practised in this country, is regulated by the Pharmacopœias of the respective Colleges. As many of the processes, however, are necessarily alike, there is no advantage in inserting the formula for every preparation, according to the different Pharmacopœias. I have therefore followed a different method. Taking the Edinburgh Pharmacopœia as the basis of this part of the work, and adopting its arrangement and nomenclature, I have added, to a translation of its processes, such observations as appeared to me necessary under each, on the theory of the operation, the circumstances to be attended to in conducting it, and the medicinal powers and applications of the substance formed. The corresponding preparations in the London and Dublin Pharmacopœias I have thought it sufficient to indicate merely by name, where the processes by which they are obtained do not differ essentially from those of the other. When they do differ in any important particular, I have introduced them into the text, and I have also

given a place to the few preparations which have none corresponding to them in the Edinburgh Pharmacopœia. A system of Pharmacy is thus presented, without that tedious repetition, which is unavoidable, when the processes of all the Pharmacopœias are regularly introduced.

CHAPTER I.

PREPARATIONS OF SOME SIMPLE MEDICINES.

The first chapter in the Edinburgh Pharmacopœia is a miscellaneous one, including under this title, a few preparations which could not well be placed under the other chapters. I have added to it some similar preparations from the London and Dublin Pharmacopœias.

Herbarum et florum exsiccatio. Drying of Herbs and Flowers.

"Herbs and flowers are to be dried with the gentle heat of a stove, or a common fire, in such a quantity that the drying may be performed as quickly as possible. Their virtues are thus best preserved, the mark of which is their retaining completely their native colour. The leaves of hemlock, and others containing a subtile volatile matter, are, immediately after drying, to be rubbed to powder, and kept in glass vessels well stopt." Directions nearly similar are given by the Dublin College.

By drying herbs and flowers, or expelling a great part of the water they contain, those spontaneous chemical changes which are favoured by humidity are prevented, and they are rendered capable of being preserved. The more quickly they are dried, they retain in general their virtues more completely, care only being taken that too much heat be not applied, as part

of their volatile principles would be dissipated, and their flavour and medicinal qualities impaired. Even when dried, they suffer some changes in keeping, probably from the action of the air and light; and some do so more rapidly than others. Hemlock, in particular, has its colour and odour impaired in a very short time; it is therefore necessary to exclude it from the air, and likewise from exposure to light.

SCILLA MARITIMA EXSICCATA. Dried Sea Squill.

"Cut the root of the sea squill, its outer covering having been removed, transversely, into thin slices, and dry it by a gentle heat. The mark of its being properly dried is, that while it is rendered friable it retains its bitterness and acrimony."

By drying, the squill loses about four-fifths of its weight, and with very little diminution of its powers, if too much heat has not been applied. It is in this state that squill is commonly employed in medicine, and for other pharmaceutic preparations. It requires to be kept in a dry place, as otherwise it regains its softness, and is liable to become mouldy.

PULPARUM EXTRACTIO. Extraction of Pulps.

Those fruits which afford a pulp, if they are unripe, or if ripe and dry, boil with a little water, that they may become soft. Then express the pulp through a hair-sieve, and boil it with a gentle heat in an earthen vessel, stirring it frequently that it may not burn, until it attain the consistence of honey.

The pulp of cassia fistula is to be boiled from the bruised pod; and then by evaporating the water, to be reduced to the due consistence. The pulps of ripe and fresh fruits are to be pressed through a sieve, without previous boiling.

These directions are given principally for the preparation of the pulps of several fruits which enter into the composition of the Electuary of Senna. Pulps are sel-

dom otherwise medicinally employed, and they cannot be long preserved unchanged.

THE following general directions are given in the London Pharmacopœia, for collecting the vegetable articles of the Materia Medica.

"VEGETABLES are to be gathered from the soil and situations where they spontaneously grow, at a dry season, and not moistened with rain or dew: they ought to be collected annually, and if they have been kept for a longer period, ought to be rejected."

"ROOTS, in general, are to be dug up before their stalks or leaves shoot forth."

"BARKS ought to be collected at that season at which they are most easily separated from the wood."

"LEAVES are to be gathered after the flowers have unfolded, and before the seeds have ripened."

"FLOWERS are to be collected recently blown."

"SEEDS are to be taken when they are ripe, and before they begin to fall from the plant. They ought to be preserved in the seed vessels."

PREPARATION OF VEGETABLES. Pharm. Lond.

"VEGETABLES, soon after they are collected, those excepted which are to be used in the recent state, are to be spread out lightly, so as to dry as quickly as possible, with a heat so gentle, that their colour may not change; they are then to be kept in proper vessels, or situations where the access of light and humidity may be excluded."

"ROOTS, which are ordered to be kept fresh, ought to be buried in dry sand. The root of squill, before drying it, is to be cut transversely into thin slices, the outer dry layers being removed."

"PULPY FRUITS, if they are not ripe, or, if ripe and dry, are to be exposed in a damp place until they become soft, then press out the pulp through a hair-sieve,

afterwards boil with a gentle heat, stirring frequently; lastly, dissipate the water by the heat of a water bath, until it has become of the proper consistence."

"On the pods of cassia bruised, pour boiling water, so as to wash out the pulp, which press first through a sieve with large holes, afterwards through a hair sieve, then evaporate the water by the heat of a water-bath, until the pulp attain the proper consistence."

"Press the pulp or juice of ripe and fresh fruits through a sieve, without any previous boiling."

OF GUM-RESINS. Pharm. Lond.

"Separate OPIUM carefully from extraneous substances, especially on its external surface. Let it be kept in the state of soft Opium, fit for forming pills; and hard Opium, rendered so by having been dried in the heat of a water-bath, so that it can be rubbed to powder."

"Those GUM-RESINS are to be accounted of the best quality, which can be selected so pure, as to require no purification. If they appear to be less pure than this, boil them in water until they become soft, and press them by a press through an hempen bag; then put them aside, that the resinous part may subside. The liquor above being poured off, evaporate it by the heat of a water-bath, adding towards the end of the evaporation the resinous part, and mixing it thoroughly with the gummy part into one mass."

"Those GUM-RESINS which melt easily may be purified by being put into an ox bladder, and kept in boiling water until they become soft, so that they may be separated from the impurities by being pressed through an hempen cloth."

"The BALSAM of STORAX is to be dissolved in rectified spirit, and strained; the spirit is then to be distilled with a gentle heat, until the balsam become of the proper consistence."

These directions, for the purification of GUM-RESINS, are the most proper perhaps that can be given; but they

are omitted by the Edinburgh College, as it is always preferable to use them medicinally, only when in that state in which they do not require purification; for, however cautiously the operation may be performed, they are always liable to suffer some change, either from the dissipation of volatile principles, or from changes of composition in those which are fixed. The process is admissible, therefore, only with regard to gum-resins, which are to be applied externally, as ammoniac or galbanum, when they are to form the basis of plasters. STORAX is a substance so rarely employed in medicine, that the ordering it to be purified may be regarded as superfluous. The Dublin College have ordered its purification, by digesting it in water with a gentle heat, and pressing it when soft between plates of iron, made hot in boiling water,—a process which must dissipate its odorous matter, on which all its powers depend. The directions given by the London College with regard to OPIUM, are preferable to a process formerly admitted, and which is to be afterwards noticed, as being retained in the Dublin Pharmacopœia, in which opium is dissolved in proof spirit, and the tincture strained, and again evaporated to the due consistence, —a process in which the opium always sustains a diminution of power.

PREPARATIONS FROM ANIMALS. Pharm. Lond.

ADEPS PRÆPARATA. Prepared Lard.

"Cut the fat into small pieces; then press it, liquefied by a gentle heat, through linen."

SEVUM PRÆPARATUM. Prepared Suet.

"Cut suet into pieces; then press it, melted by a gentle heat, through linen."

The design of these processes is to free the fat from the membranous fibres intermixed with it; but, as it is generally prepared before it is brought to the shops, the Edinburgh College have omitted the directions they

formerly gave. If the heat be raised too high, the fat acquires a brown colour and empyreumatic smell; it is therefore usually melted with a little water, by which this is prevented.

CORNU USTUM. Burnt Horn. Ph. Lond. (Pulv. Cornu Cerv. Ust. *Ph. Dub.*)

"Burn pieces of horn in an open fire, until they become perfectly white; then rub them to powder, and prepare them in the same manner that chalk is prepared."

The base of horn, like that of bone, consists of phosphate of lime, or at least it is this earthy compound that remains when bones are burnt, mixed with a little carbonate and sulphate of lime; and in the bones of some animals, phosphate of magnesia and fluate of lime. The gelatin of the horn or bone is decomposed during the burning; its carbonaceous matter partly remains, giving a black colour, but by continuing the heat, this also is burnt out. The phosphate of lime is a substance apparently altogether inert, though, from a theoretical view as to the cause of rickets and mollities ossium, it has been proposed to be given as a remedy in these diseases. It is used to reduce substances which are rather soft and tenacious, as opium, to powder, being rubbed along with them; and its powder is sometimes employed as a dentifrice.

SPONGIA USTA. Burnt Sponge. Ph. Lond. (Pulvis Spongiæ Ustæ, *Ph. Dub.*)

"Cut sponge into pieces; and bruise it, so that it may be freed from adhering extraneous bodies; then burn it in a close iron vessel, until it become black and friable; lastly, rub it into a very fine powder."

Burnt sponge has been celebrated as a remedy in bronchocele, and in scrofulous affections of the glands, given in a dose from 20 to 30 grains. It consists chiefly of carbonate of soda and carbonaceous matter; but it has been stated as a reason for its being retained in the

London Pharmacopœia, that it produces effects as a medicine, which are not to be obtained from a mixture of the alkali and charcoal alone.

Burnt sponge has likewise a place in the Dublin Pharmacopœia, being prepared in a similar manner; and the following preparation is likewise inserted, which probably affords an analogous product.

PULV. QUERCUS MARINÆ. Powder of Sea Oak, or Sea Wrack. Pharm. Dub.

"Take of sea wrack with its vesicles any quantity. Free it from its impurities and dry it; then put it into an iron pot or crucible with a perforated cover, and expose it to the fire, until the vapour which arises cease, and the mass become of a dull red. Reduce the carbonaceous residuum to powder, and preserve it in close vessels."

TESTÆ PRÆPARATÆ. Prepared Shells. Pharm. Lond.

"Wash the shells previously freed from impurities with boiling water; then prepare them in the manner ordered with regard to chalk."

This process is designed to give a carbonate of lime purer than the prepared chalk. The product is at least more smooth, and free from the coarser earthy matter diffused through chalk. It contains too a portion of animal matter, probably gelatin, but so highly indurated as not to be easily extracted by water, and not to be liable to spontaneous decomposition.

UNDER this chapter, the Edinburgh College have inserted a preparation of sulphur, the Washed Sulphur; to which may be added, the Precipitated Sulphur of the London Pharmacopœia.

SULPHUR SUBLIMATUM LOTUM. Washed Sublimed Sulphur.

"Take of Sublimed Sulphur, one pound; Water, four pounds. Boil the sulphur for a short time in the water, then pour off this water, and adding cold water wash away all the acid; lastly, dry the sulphur." A similar process has a place in the Dublin and London Pharmacopœias.

The sublimation of sulphur is usually conducted on a large scale, and the vapours of the sulphur, which first rise, receiving a little oxygen from the atmospheric air of the subliming vessel, or of the chamber in which they are condensed, a slight degree of acidity is liable to be acquired, which it is the object of this process to remove. Any acidity, however, is so slight, that it is scarcely perceptible in the sublimed sulphur of the shops; the process is therefore superfluous, and is never attended to.

SULPHUR PRÆCIPITATUM. Precipitated Sulphur. Pharm. Lond.

"Take of Sublimed Sulphur, one pound; Lime recently prepared, three pounds. Boil the sulphur and the lime together in water; strain the liquor through paper, and drop into it muriatic acid, as much as may be sufficient to precipitate the sulphur. Lastly, pouring water on this frequently, wash it until it remain tasteless."

The sulphur is in the first stage of this process combined with the lime; and, at the same time, as always happens when sulphur is enabled to act on water, by the resulting affinity of an alkaline base, a decomposition of a portion of water takes place; its oxygen unites with a little of the sulphur, and forms sulphuric acid, with which part of the base combines; the hydrogen of the decomposed water unites with another portion of sulphur, forming sulphuretted hydrogen, and this enters into combination with the remaining sulphur, and base, and by its affinity prevents any farther decomposition. The solution, therefore, neglecting the small portion of sulphate which it may contain, is a ternary

compound of sulphur, sulphuretted hydrogen, and the alkaline or earthy base. When an acid is added, it combines with the base, and precipitates the sulphur, while the small quantity of sulphuretted hydrogen is disengaged in the elastic form. In the present process, therefore, the solution obtained by boiling the lime and sulphur, is a compound of these with sulphuretted hydrogen, what may be named a Sulphuretted Hydrosulphuret of Lime. On adding muriatic acid, it combines with the lime; and this muriate of lime being very soluble, remains dissolved in the water; the sulphuretted hydrogen is disengaged; and the sulphur being insoluble is precipitated.

The process, under this point of view, may be supposed to have no object, as the sulphur is merely recovered; and it cannot indeed be said to have much advantage. The precipitated sulphur, however, is of a whiter colour than sublimed sulphur, and is therefore preferred in making sulphur ointment, the only purpose to which it is applied. This whiteness may be owing either to its state of aggregation, or to its combination with a little water, for the yellow colour is restored on melting it. That it is owing to the presence of water, is rendered probable, from the same whiteness being produced by dropping water on melted sulphur, or receiving the vapours of sulphur in a vessel filled with watry vapour. Common sulphur, it appears from recent experiments, contains hydrogen with a little oxygen; and it is not improbable, that precipitated sulphur may contain a larger proportion of hydrogen, which it may attract in its precipitation. The whiteness of the precipitated sulphur of the shops is usually increased by precipitating the solution of the sulphuretted hydrosulphuret of lime, not by muriatic, but by sulphuric acid, the sulphate of lime being thrown down, intimately mingled with the sulphur. This renders it less fit for internal administration.

CHAPTER II.

CONSERVÆ.—CONSERVES.

Conserves are compositions of fresh vegetable matter with sugar. The form is designed to preserve such vegetables as lose their virtues by drying: to obviate the decomposition to which this matter is liable, three times its weight of refined sugar is in general necessary. The active matter of vegetables is, however, generally injured by keeping in this form; and, therefore, there is no conserve ordered in the Pharmacopœia of any powerful medicine, those which are inserted being merely recommended by their agreeable flavour, and being not used but as vehicles for the exhibition of more active remedies, under the form of bolus, pill, or electuary.

In the Edinburgh Pharmacopœia there are the following conserves.

Conserva exterioris recentis fructus Citri Aurantii radula abrasa. Conserve of the outer rind of the Orange rasped by a grater.

Conserva Fructus Rosæ Caninæ maturi, a seminibus eorumque pube sollicite purgati. Conserve of the fruit of the Dog-hip, carefully freed from the seeds and included down.

Conserva Petalorum Rosæ Gallicæ nondum explicitorum. Conserve of the unblown Petals of the Red Rose.

In the preparation of these, the vegetable matter is directed to be beat into a pulp, to which is to be added gradually, during the beating, three times its weight of refined sugar.

The first of them, the Conserve of Orange Peel, is so little used, that it is seldom to be found in the shops. The Conserve of Dog-hip is smooth and uniform in its consistence, and is therefore well adapted to the purpose

to which it is applied, that of serving as a vehicle for active medicines, under the form of bolus or pill. The Conserve of the Petals of the Red Rose is supposed to retain their slight astringency, and at one time was celebrated as a remedy in hæmoptysis and phthisis. It is still a popular medicine in these diseases, being taken in the dose of an ounce in the morning, diffused in warm milk.

The London College have united the Conserves with the preparations named Electuaries, and have given them the common name of Confections. Of those which correspond with what have usually been denominated Conserves, they have retained the three which have a place in the Edinburgh Pharmacopœia. The Dublin College admit only the Conserve of the Rind of the Orange, and the Conserve of the Petals of the Red Rose.

CHAPTER III.

SUCCI.—JUICES.

Juices are obtained from fresh vegetables by expression. They consist chiefly of the sap of the plant, mixed, however, more or less, with the proper juices; and according as these are in greater or less abundance, or easily expressed from their vessels, the juice will be more largely impregnated with them. It may hold dissolved mucilage, extractive matter, tannin, and any of the vegetable acids; and fecula is frequently suspended in it, with sometimes perhaps a portion of resin, diffused by the medium of the other principles.

When newly expressed, these juices are generally impure and viscid: on standing for some time, they deposite a quantity of mucilaginous matter, along with grosser impurities; the clear liquor is poured off, and passed repeatedly through a fine linen cloth, by which it is rendered more pure. A small quantity of alkohol,

generally about one-fortieth part of the weight, is added; the juice, on standing, deposites, after this addition, another sediment; from this it is poured off, and the clear liquor is put into bottles, which are to be kept in a cool place. By these processes, however, much of the active matter is frequently removed, or chemically changed, and the juice is rendered comparatively inert; and besides it is always liable to decomposition on keeping, from the re-action of the elements of the vegetable matter. This form of preparation is therefore an improper one; it is rejected, with propriety, from the London and Dublin Pharmacopœias; and there is only one officinal juice retained by the Edinburgh College, which might also be discarded, as it is never used, nor kept in the shops. It is named

SUCCUS COCHLEARIÆ COMPOSITUS, *vulgo Succi ad Scorbuticos.*
Compound Juice of Scurvy Grass.

"Take of Juice of Scurvy Grass, Juice of Water Cresses from the herbs recently gathered, Juice of the fruit of the Orange, of each two pounds; Spirit of Nutmeg, half a pound. Mix them, and put aside the liquor until the impurities subside; then pour it off."

This used to be employed as a remedy in scurvy, in the dose of half a pound daily; but it has long been in total disuse.

CHAPTER IV.

SUCCI SPISSATA, VULGO EXTRACTA.—INSPISSATED JUICES, COMMONLY NAMED EXTRACTS.

THE juice expressed from succulent vegetables, frequently holds dissolved, or diffused through it, the principles in which the medicinal powers of the plant reside. But containing a large proportion of water, and being liable to decomposition, the process of inspissation

is employed to obtain the active matter in a more concentrated state, and to obviate this spontaneous change. The preparations thus obtained are named Inspissated Juices, formerly Extracts.

In the greater number of cases, however, this operation cannot be performed without injury to the active matter. Any volatile principle is necessarily dissipated; and even where there is no injury of this kind, the vegetable matter, at the temperature required, suffers decomposition, either from the re-action of its elements, in consequence of which they enter into new combinations, or from the chemical action of the oxygen of the air. Extractive matter, such as that contained in the juices of plants, becomes insoluble from mere exposure to the air, as Vauquelin observed: this change takes place more rapidly at the temperature of boiling water, as Fourcroy has shown; and T. Saussure, who has examined these changes more minutely, has found that they are accompanied with an absorption of oxygen from the air, and a formation of carbonic acid, with probably, likewise, as he inferred, a formation of water, from the union of part of the oxygen and hydrogen of the vegetable matter. Such changes must give rise to alterations in the medicinal powers of these substances, and hence we cannot rely on the activity and uniformity of operation in these inspissated juices. Even after they are prepared too, they must continue to suffer a slow spontaneous decomposition, and hence their activity must diminish with age.

From the analysis of these inspissated juices, they appear to contain usually a large proportion of saline matter, principally acetates of potash, lime and ammonia, frequently free acetic acid, and sulphate and muriate of potash, and sulphate of lime.

The directions for preparing the inspissated juices are given in the Edinburgh Pharmacopœia, under the formula for the first of them, that of Wolfsbane. The Dublin College direct, that the juice, after expression, shall remain at rest for six hours, that its feculencies may

subside before evaporation. The London College, with more propriety, order it to be evaporated without depuration.

Succus spissatus aconiti napelli. Inspissated Juice of Aconite or Wolfsbane.

"The fresh leaves of the aconite are to be bruised, and being inclosed in a hempen bag, are to be pressed strongly, that they may give out their juice, which is to be reduced by evaporation in open vessels, heated by boiling water saturated with muriate of soda, to the consistence of thick honey. The mass, after it has cooled, is to be kept in glazed earthen vessels, and moistened with alkohol."

This inspissated juice is the form under which wolfsbane was introduced into practice by Störck. He recommended it in glandular swellings, scrofulous and venereal affections, gout, and in obstinate chronic rheumatism, in a dose of half a grain night and morning, and gradually increased to five or six grains. It is very seldom prescribed.

In the same manner are prepared the following Inspissated Juices from the leaves of their respective plants.

Succus spissatus atropæ belladonæ. Inspissated Juice of Deadly Nightshade.

This has been recommended by the German practitioners in schirrus, cancer, in epilepsy and mania, in a dose of one grain gradually increased. It retains the peculiar property of the plant, that of occasioning dilatation of the pupil, whence it has also been prescribed in amaurosis.

Succus spissatus conii maculati. Inspissated Juice of Hemlock.

Under this form, hemlock was employed by Störck in scirrhus and cancer. The dose given is at first two grains, but it requires to be quickly increased, and it

has at length been taken to the extent of several drachms in the day. In the preparation of it, the narcotic power of the hemlock seems always to be more or less impaired; it is also injured by keeping, and we have no other test of its activity than the strength of its narcotic odour. It is therefore inferior to the dried leaves of the plant, which are likewise, however, liable to a considerable degree of uncertainty, according to the manner in which they have been dried and preserved. A common form of exhibition is that of the inspissated juice made into pills by the addition of a sufficient quantity of the powder of the leaves; but, on the whole, the powder alone is to be preferred, both as being in general more active and uniform, and as we have a test of its proper preparation more certain in the richness of its green colour.

Succus spissatus hyoscyami nigri. Inspissated Juice of Black Henbane.

This inspissated juice retains a considerable degree of narcotic power, and the plant resembling opium in its operation, it is occasionally employed as a substitute for it. The dose has been usually one grain, which requires to be increased; two grains are perhaps not more than equivalent to one grain of opium. The tincture has been introduced as a more certain preparation.

The London College admit the four preceding Inspissated Juices, giving them the name of Extracts. The Dublin College have inserted those only of Hemlock and Henbane.

Succus spissatus lactucæ virosæ. Inspissated Juice of Strong-scented Lettuce. *Ph. Ed.*

This plant, though a narcotic, has been principally used as a diuretic. It was recommended as a remedy in dropsy by the German practitioners, in a dose of four or five grains, gradually increased to one or two drachms in twenty-four hours; but in this country it has been little used.

Succus spissatus sambucci nigræ, *vulgo Rob Sambuci.* Inspissated Juice, or Rob of Elder.

The preparation of this juice, as directed in the Edinburgh Pharmacopœia, is peculiar. "Five pounds of the juice of Elder Berries, and one pound of Sugar, are to be boiled with a gentle heat to the consistence of thick honey."

It has been given as an aperient or moderate laxative and diuretic in a dose of half an ounce, or one ounce; but it possesses no quality to recommend it. In the preparation of it in the Dublin Pharmacopœia, it is merely inspissated without sugar.

Succus spissatus momordicæ elaterii, *vulgo Elaterium.* Inspissated Juice of Wild Cucumber, or Elaterium.

"Cut the ripe fruit of the wild cucumber, and pass through a very fine hair-sieve the juice lightly expressed; boil it a little, and set it aside for some hours until the thicker parts subside. Pour off the thinner part which floats above, and separate the rest by straining. The thicker part which remains after the straining, being covered with a linen cloth, is to be dried by a gentle heat." Similar directions are given in the Dublin and London Pharmacopœias, omitting only the boiling,—an omission which is proper, if this substance be a fecula, as has been usually supposed.

From the mode of preparation, it is obvious that this consists of a matter which had been suspended in the juice, and hence it has been generally regarded as a species of fecula, without having been, however, very particularly examined. It is a very violent cathartic, operating powerfully in a dose of one or two grains. It has been used as a hydrogogue in dropsy, and as a cathartic in obstinate constipation, where others have failed. The violence, and in some measure the uncertainty of its operation, prevent its frequent use; and it is seldom even to be found in the shops.

CHAPTER V.

OLEA FIXA SIVE EXPRESSA.—FIXED OR EXPRESSED OILS.

Expressed oils are distinguished by their unctuosity and insipidity, by being insoluble in water and in alkohol, by being incapable of volatilization without change, and by combining with the alkalis, forming soaps. They exist in the fruit and seeds of vegetables, and are obtained by expression, or decoction with water. The former method is in general to be preferred; and to afford the oil pure it must be performed without heat, which, though it favours the separation of the oil, communicates to it acrimony and an unpleasant flavour. To preserve them from becoming rancid, they ought to be kept secluded from the air, this change being produced in them by absorption of oxygen.

A process in Pharmacy somewhat difficult is to mix these oils with any watery fluid, so that they may be conveniently exhibited. It is usually done by the medium of mucilage, or of an alkali. If triturated with mucilage, and a small quantity of sugar, the oil is diffused through the water, and a milky liquor is formed, in which, however, the diffusion is rather imperfect. A combination more complete and permanent is effected, by adding a few drops of water of ammonia, or two or three grains of sub-carbonate of potash.

The directions for preparing these oils in the Edinburgh Pharmacopœia are given under the Oil of Almonds.

Oleum amygdalæ communis. Oil of Almonds.

"Take of Fresh Almonds any quantity. Bruise them in a stone mortar, inclose them in a hempen bag, and express the oil by a press without heat."

The oil thus obtained is the purest of the expressed

oils, being limpid and entirely free from odour or taste. It is used as a demulcent, and for the general medicinal purposes to which expressed oils are applied.

In the same manner is to be expressed OLEUM LINI USITATISSIMI, Oil of Lintseed, from the seeds of the plant. Being less pure, it is used only as an external application. Usually, it is prepared on the large scale; and to remove the mucilage, heat is employed.

To these the London College add OLEUM RICINI, Castor Oil, ordering it to be prepared by bruising the seeds, from which the external pellicle has been removed, and expressing the oil without any application of heat. This oil is usually prepared, however, in the West Indies by decoction, and is milder than when obtained by expression. The Olive Oil, OLEUM OLEÆ EUROPÆÆ, which of all the expressed oils is most largely employed, is imported from the South of Europe.

CHAPTER VI.

EMULSIONES.—EMULSIONS.——MISTURA.—MIXTURES.

EMULSIONS are preparations in which the expressed oil of the seeds or kernels, from which they are made, is diffused through water by the medium of the sugar, mucilage, and fecula, which the seeds contain. They may be made from lintseed, from the seeds of the poppy, and from other oily seeds: but they are always ordered to be prepared from almonds, as being free from any disagreeable flavour or taste. They are always opaque and milky. As the oil is merely diffused through the water, it gradually separates and rises towards the surface. The fluid beneath is like whey in its appearance, and it soon becomes acescent from the slow fermentation of the saccharine matter. The addition of vinous spirits, or of any weak acid, decomposes emul-

sions, separating the oil. In prescribing them, therefore, it is necessary to avoid combining with them any tincture, or any substance having acidity.

Emulsio amygdalæ communis. Almond Emulsion. (Mist. Amygdalæ, *Ph. Lond.*—Lac. Amygdal. *Dub.*)

"Take of Sweet Almonds, one ounce; Water, two pounds and a half; beat the blanched almonds carefully in a stone mortar, adding the water gradually, then strain."

The almonds are blanched, or freed from their thin rind, by keeping them a minute or two in boiling water, when the rind is easily detached. They require to be well beat as the water is added. The emulsion is used as a diluent and demulcent in catarrh and gonorrhœa, or during the application of a blister, being drunk *ad libitum*, and it is more grateful than any other preparation.

Emulsio gummi mimosæ niloticæ, *vulgo Emulsio Arabica*. Arabic Emulsion. (Emulsio Arabica, *Ph. Dub.*)

"This is made in the same manner, adding, while beating the almonds, two ounces of mucilage of gum Arabic."

It is used in the same cases as the preceding, and from the addition of the mucilage is supposed to have rather more demulcent power.

Emulsio camphorata. Camphor Emulsion.

"Take of Camphor, one scruple; blanched Sweet Almonds, two drachms; Refined Sugar, one drachm; Water, six ounces: Let it be made in the same manner as the Almond Emulsion."

Camphor is less apt to occasion nausea or uneasiness at the stomach when given in a liquid than when in a solid form; and this is one of the best forms of preparation, the camphor being completely diffused. Its dose is two ounces, but as this narcotic is not much employed internally in modern practice, the camphor emulsion is not often prescribed.

MISTURA.—MIXTURES.

To the preparations named Emulsions, the London College have extended the general name of Mixture, which is employed in Pharmacy to denote those preparations in which different ingredients are mingled together in the liquid form, or in which solid substances are diffused through liquids by the medium of mucilaginous or saccharine matter. And under this name of Mixture are inserted several compound medicines, both in the London and Dublin Pharmacopœia, of which it is necessary to take notice. Some of these had formerly a place in the Edinburgh Pharmacopœia; but they have been discarded, probably from the consideration that they must always be prepared extemporaneously, and may therefore be varied according to the intention of the prescriber.

MISTURA AMMONIACI. Gum Ammoniac Mixture. Ph. Lond. (Lac Ammoniac. *Ph. Dub.*)

"Take of Gum Ammoniac, two drachms; Water, half a pint. Triturate the ammoniac with the water poured on it gradually until they are intimately mixed." In the Dublin Pharmacopœia, one drachm of Gum Ammoniac is diffused by trituration in eight ounces of Pennyroyal Water, and the mixture is strained through a linen cloth.

In these mixtures the resinous matter is suspended in the water by the medium of the gum, and a milky liquor is formed. From this the resin subsides slowly. Under this form this gum-resin is sometimes prescribed as an expectorant, the dose of the mixture being from half an ounce to an ounce.

MISTURA ASSAFOETIDÆ. Assafœtida Mixture. Ph. Lond. (Lac Assafœtidæ, *Ph. Dub.*)

"Take of Assafœtida, two drachms; Water, half a pint. Rub the assafœtida with the water added gradually until they are perfectly mixed." In the Dublin Pharma-

copœia, one drachm of Assafœtida is diffused by trituration in eight ounces of Pennyroyal Water.

The resin of the assafœtida is in this mixture likewise suspended in the water by the medium of the gum. It is a form under which this fœtid drug is prescribed in the hysteric paroxysm, from half an ounce to an ounce being given and repeated at short intervals.

Mistura camphoræ. Camphor Mixture. Ph. Lond. (Mistura Camphorata, *Ph. Dub.*)

"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." In the Dublin Pharmacopœia, the preparation is a little different; one scruple of Camphor being rubbed with ten drops of rectified spirit; half an ounce of refined sugar being added, and a pound of water, and the liquor being strained through a linen cloth.

Boiling water was formerly ordered in making this mixture, by which much of the camphor was volatilized, and very little dissolved. Even at a low temperature, the water scarcely dissolves any appreciable quantity, and it can be regarded only as receiving odour and some degree of taste, without any such impregnation as shall communicate to it medicinal efficacy.

Mistura cornu usti. Mixture of Burnt Horn. Ph. Lond. (Decoctum Cornu Cervini. Decoction of Hartshorn, *Ph. Dub.*)

"Take of Burnt Horn, two ounces; Gum Arabic in powder, one ounce; Water, three pints. Boil down to two pints, stirring constantly; then strain."

This is an absurd preparation, introduced at a time when the principles of Pharmacy were nearly unknown, and retained merely from the influence of habit. The burnt hartshorn, (which is chiefly phosphate of lime), is perfectly insoluble in water; the gum alone therefore is dissolved; the hartshorn, by the continued boiling, is diffused, and kept suspended by the mucilaginous liquid; but this might equally be done without this ope-

ration; and when done it can communicate to the preparation no medicinal power.

MISTURA CRETÆ. Chalk Mixture. *Ph. Lond. and Dub.*

"Take of Prepared Chalk, half an ounce; Refined Sugar, three drachms; Gum Arabic in powder, half an ounce; Water, a pint. Mix them."

The chalk is in this mixture suspended by the mucilage; it is taken as an antacid in the dose of one or two ounces occasionally; but it may be doubted whether the mucilage and sugar will not rather be injurious in that state of the stomach which generates acidity.

MISTURA FERRI COMPOSITA. Compound Mixture of Iron. Ph. Lond.

"Take of Myrrh in powder, one drachm; Sub-carbonate of Potash, twenty-five grains; Rose Water, seven fluid ounces and a half; Sulphate of Iron in powder, one scruple; Spirit of Nutmeg, half a fluid ounce; Refined Sugar, a drachm. Rub the myrrh with the sub-carbonate of potash and the sugar, and, during the rubbing, add first the rose water, and the spirit of nutmeg, and afterwards the sulphate of iron. Put the mixture immediately into a proper glass vessel, which stop closely."

This, with a few trivial alterations, is the celebrated Antihectic Mixture of Griffith; which, as first invented, was undoubtedly an unchemical mixture, the prescriber not being aware of the changes produced in the active ingredients by their mutual action, but which, in practice, was found possessed of peculiar advantages. The sulphate of iron, it is obvious, is decomposed by the sub-carbonate of potash, the sulphuric acid combining with the potash, while the carbonic acid unites with the oxide of iron. The carbonate of iron which is formed is diffused in the mixture along with the myrrh, and both are probably kept more completely suspended by an excess of alkali. This chalybeate proves much less irritating than the sulphate of iron, producing no unpleasant effect on the stomach, and at the same time it

is more active than the common carbonate or rust of iron, in which the iron is at the maximum of oxidation, while, in the present preparation, it is at the minimum, is in a different state of aggregation, and probably combined with a larger quantity of carbonic acid. To preserve it in this low state of oxidation, it is ordered to be kept in a bottle closely stopped; but as iron has a strong tendency to pass to a more highly oxidated state, and suffers this change very rapidly from the action of the air, it is preferable that the preparation should be always extemporaneously made. Griffith's Mixture was employed as a remedy in hectic fever, in chlorosis, and other diseases in which iron is given as a tonic. The mixture of the London Pharmacopœia, which is nearly of the same strength, may be given in the same cases in a dose of an ounce once or twice a day.

MISTURA GUAIACI. Guaiac Mixture. Ph. Lond.

"Take of the Gum-Resin of Guaiac, a drachm and a half; Refined Sugar, two drachms; Mucilage of Gum Arabic, two fluid drachms; Cinnamon Water, eight fluid ounces. Rub the guaiac with the sugar, then with the mucilage, adding gradually, while these are rubbed together, the cinnamon water."

This may be a convenient form for the exhibition of guaiac, though there appears to be no great advantage in multiplying these extemporaneous prescriptions.

MISTURA MOSCHI. Musk Mixture. Ph. Lond.

"Take of Musk, Gum Arabic, Refined Sugar, of each one drachm; Rose Water, six fluid ounces. Rub the musk with the sugar, then with the gum, and add gradually the rose water."

The same observation applies to this as to the preceding preparation. Its dose, when it is prescribed, is an ounce, or an ounce and a half.

CHAPTER VII.

INFUSA.—INFUSIONS.

Infusion is a general term, which might be applied to that process by which the soluble parts of any solid are extracted by the action of any fluid kept in contact for some time with the body on which it acts. In Pharmacy it is usually limited to that case where the active matter of vegetable substances is extracted partially or completely by water, though it is sometimes extended to the same process where other liquors, as alkohol, are employed. It is in the former sense, as denoting an aqueous preparation, that the term is used in the Pharmacopœias; and Infusions are solutions of vegetable matter in water obtained by maceration.

Several of the proximate principles of vegetables being soluble in water, they can often, by this operation, be extracted with advantage. But there are others with regard to which it is altogether useless. Thus the purgative quality of rhubarb is extracted by infusion in water: even the cathartic power of senna, though it appears to reside in a principle more peculiarly soluble in alkohol, is still obtained by the action of water, when a large quantity is employed, and its solvent power is promoted by heat. But the power of jalap is scarcely obtained, the watery infusion of it being comparatively weak. In prescribing infusions, therefore, regard must always be had to the composition of the substances ordered to be infused. In general, mucilaginous plants yield their mucilage readily to water: bitterness and astringency are also usually extracted by water with facility, and the aromatic quality where this resides in an essential oil. With regard to other properties, scarcely any general rule can be delivered.

The quantity and quality of the matter extracted by infusion, are considerably varied by the temperature of

the fluid. Infusions made with warm water, are considerably stronger than those made with cold; in some cases, however, especially with respect to bitters, they are less grateful. In the Bitter Infusion, therefore, of the Edinburgh Pharmacopœia, cold water is directed to be used; in all the others, boiling water is ordered to be poured on the materials of the infusion, and the vessel is generally placed near a fire.

It is rather singular, that dried vegetables yield their virtues to water by infusion, more readily than when they are in the recent state, probably from the vegetable matter being more easily penetrated by the water.

Infusions are always injured by keeping. Though at first transparent, they soon become more or less turbid; they deposite a mucous-like substance; lose their peculiar taste, and after some time acquire a putrid smell,—changes owing to the gradual decomposition of the vegetable matter they hold dissolved. Infusions are therefore never kept ready prepared in the shops; they are to be regarded as extemporaneous preparations, which, in general, require several hours before they can be prepared.

INFUSUM CINCHONÆ OFFICINALIS. Infusion of Peruvian Bark. (Infus. Cinchonæ, *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, one ounce; Water, one pound. Macerate them for twenty-four hours, and strain." The formula, as given in the other Pharmacopœias, is nearly the same, only that boiling water is ordered to be poured on the bark by the London College, while by the Dublin College the maceration is without heat.

By infusion, water is capable of dissolving only a small portion of the active matter of bark, and the preparation therefore cannot be regarded as having much activity. It is used principally as a bitter in dyspepsia, in a dose of two ounces occasionally.

INFUSUM DIGITALIS PURPUREÆ. Infusion of Foxglove. (Infus. Digital. *Ph. Lond.*)

"Take of the dried leaves of Foxglove, one drachm; Boiling Water, eight ounces; Spirit of Cinnamon, one ounce. Macerate for four hours, and strain."

Infusion is the form under which Dr. Withering, who introduced the use of digitalis in dropsy, recommended it to be given, and it is on the whole the best form under which it can be given, with the view at least to obtain its diuretic operation. The above is the formula of Withering, and it has likewise been received with no essential difference into the London Pharmacopœia. Its dose is an ounce taken twice a day, and continued until the effects of the remedy appear.

INFUSUM GENTIANÆ LUTEÆ COMPOSITUM, *vulgo Infusum Amarum.* Compound Infusion of Gentian. (Infus. Gentianæ, *Ph. Lond. Dub.*)

"Take of Gentian Root cut, half an ounce; Dried Orange-Peel bruised, one drachm; Coriander Seeds bruised, half a drachm; Diluted Alkohol, four ounces; Water, one pound. First pour on the alkohol, and after three hours the water; then macerate without heat for twelve hours, and strain."

This bitter infusion is employed in dyspepsia: a sufficient quantity of alkohol is added to aid the solvent power of the water, and to preserve the infusion from spontaneous decomposition, while there is not so much as to give spiritous pungency. It is therefore better adapted to continued use than the bitter tinctures. Its dose is two ounces occasionally. The Dublin College have a similar preparation, under the same name. The London College omit the alkohol; and in an infusion which may be always extemporaneously prepared, and does not therefore require to be long kept, this is perhaps preferable, as avoiding the pernicious consequences arising from the stomach being accustomed to the stimulus of ardent spirit.

INFUSUM MIMOSÆ CATECHU, *vulgo Infusum Japonicum.* Infusion of Catechu. (Infus. Catechu, *Ph. Lond.*)

"Take of Extract of Catechu in powder, two drachms and a half; Bark of Cinnamon bruised, half a drachm; Boiling Water, seven ounces; Simple Syrup, one ounce. Macerate the extract and bark with the water in a closed vessel for two hours, then strain and add the syrup."

The Extract of Catechu is entirely soluble in water. This preparation, therefore, possesses all its virtues unimpaired, and rendered more grateful, by the addition of the cinnamon. Hence it is one of the best forms under which catechu can be prescribed. Its principal use is in diarrhœa: its dose, one ounce every third or fourth hour. A small quantity of tincture of opium is frequently added to it with advantage.

INFUSUM RHEI PALMATI. Infusion of Rhubarb. (Infus. Rhei, *Ph. Lond.*)

"Take of the Root of Rhubarb bruised, half an ounce; Boiling Water, eight ounces; Spirit of Cinnamon, one ounce. Macerate the root with the water in a closed vessel for twelve hours, then, adding the spirit, strain the liquor."

The infusion of rhubarb is supposed to have more of the purgative than of the astringent power. It is accordingly used as a mild cathartic, in a dose of two or three ounces. There appears to be an unnecessary waste of rhubarb in the proportions ordered; and the formula in the London Pharmacopœia, in which only a drachm of rhubarb is ordered to eight ounces of water, is preferable, as this will probably afford as much active matter as the water can dissolve, or at least give an infusion sufficiently strong.

INFUSUM ROSÆ GALLICÆ. Infusion of Red Rose.

"Take of the Dried Petals of the Red Rose, two ounces; Boiling Water, five pounds; Sulphuric Acid, one drachm; Refined Sugar, two ounces. Macerate the petals with the boiling water in an earthen vessel, which

is not glazed with lead, for four hours; then, having poured on the acid, strain the liquor, and add the sugar."

This infusion, which has a place in all the Pharmacopœias, is used principally as a moderately astringent gargle, in slight cases of cynanche, or to check salivation. It owes little else than colour, and a pleasant flavour, to the petals of the rose; the astringency depending almost entirely on the sulphuric acid.

INFUSUM TAMARINDI INDICÆ CUM CASSIA SENNÆ. Infusion of Tamarind and Senna. (Infus. Sennæ cum Tamarindis, *Ph. Dub.*)

"Take of the Prepared Fruit of the Tamarind, one ounce; Senna Leaves, one drachm; Coriander Seeds, half a drachm; Unrefined Sugar, half an ounce; Boiling Water, eight ounces. Macerate them in a close earthen vessel, which is not glazed with lead, shaking frequently, and after four hours strain the liquor. It may be made also with double or triple the quantity of senna." A similar formula is inserted in the Dublin Pharmacopœia, Cardamom being substituted for coriander seeds.

This combination affords a very pleasant purgative, mild in its operation. The whole quantity may be taken at intervals as a dose. If a more powerful cathartic is indicated, it may be made with an increased proportion of senna. The direction of not infusing the materials in a vessel glazed with lead, ought to be attended to, as the acid of the tamarinds acting on the lead, the infusion might receive a noxious impregnation.

THERE are some Infusions peculiar to the London and Dublin Pharmacopœias, which may be noticed.

INFUSUM ANTHEMIDIS. Infusion of Chamomile. Ph. Lond.

"Take of Flowers of Chamomile, two drachms; Boiling Water, half a pint. Macerate them for ten minutes in a vessel lightly closed, and strain."

Under the form of infusion, chamomile is used as a bitter in dyspepsia: it is more grateful when prepared with cold water, and is then equal perhaps to any other bitter.

INFUSUM ARMORACIÆ COMPOSITUM. Compound Infusion of Horse-Radish. Ph. Lond.

"Take of Horse-Radish Root, fresh and cut, Mustard Seed bruised, of each one ounce; Boiling Water, a pint. Macerate them for two hours in a vessel lightly closed, and strain; then add, of Compound Spirit of Horse-Radish, a fluid ounce."

Under this form the horse-radish may be prescribed in the diseases in which it is employed, more particularly as a stimulant in chronic rheumatism, paralysis, and some forms of dropsy. Its dose is two ounces twice a day.

INFUSUM AURANTII COMPOSITUM. Compound Infusion of Orange-Peel. Ph. Lond.

"Take of dried Rind of the Orange, two drachms; of the fresh Rind of the Lemon, one drachm; of Cloves bruised, half a drachm; Boiling Water, half a pint. Macerate for a quarter of an hour in a vessel lightly closed, and strain."

This affords a bitter, grateful and somewhat pungent, which may be employed with advantage in some forms of dyspepsia. Its dose is two ounces.

INFUSUM COLUMBÆ. Infusion of Colombo. Ph. Lond.

"Take of Colombo Root cut, one drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

The active matter of colombo is rather imperfectly extracted by water; and this can be regarded only as a bitter infusion, which, like other bitters, may be used in dyspeptic affections. Its dose is two ounces.

Infusum caryophyllorum. Infusion of Cloves. Ph. L.

"Take of Bruised Cloves, a drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

The aromatic odour and pungency of the clove are extracted in this infusion: it may be used with advantage as a warm and grateful stimulant in some forms of dyspeptic affection, where a sensation of cold and uneasiness is felt at the stomach,—a state which is often produced where the habit of taking spiritous cordials has been indulged in.

Infusum cascarillæ. Infusion of Cascarilla. Ph. L.

"Take of Cascarilla Bark bruised, half an ounce; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

Cascarilla is a substance little valued in modern practice, and there does not appear to be much propriety in the introduction of this infusion as an officinal preparation. Its dose is two ounces.

Infusum cusparIæ. Infusion of Angustura. Ph. Lond.

"Take of the Bark of Angustura, bruised, two drachms; Boiling Water, half a pint. Macerate for two hours, in a vessel lightly closed, and strain."

The same remark nearly applies to this preparation, as to the preceding one. Under this form, however, angustura may be occasionally used as a remedy in dyspepsia. The dose is two ounces.

Infusum lini. Infusion of Lintseed. Ph. Lond.

"Take of Lintseed bruised, one ounce; Liquorice Root cut, half an ounce; Boiling Water, two pints. Macerate for four hours, nigh the fire, in a vessel lightly closed, and strain."

The mucilaginous matter of lintseed is very readily dissolved by tepid water; and this forms a demulcent liquor, often taken with advantage in gonorrhœa, dy-

suria, and sometimes in catarrh. It is rendered rather more grateful by the addition of a little lemon juice, and of the rind of the lemon.

Infusum quassiæ. Infusion of Quassia. Ph. Lond.

"Take of the wood of Quassia cut, one scruple; Boiling Water, half a pint. Macerate for two hours, in a vessel lightly closed, and strain."

Quassia is a very pure bitter, and its bitterness is extracted by water. Under this form it has been used as a remedy in dyspepsia.

Infusum sennæ. Infusion of Senna. Ph. Lond.

"Take of Senna leaves, an ounce and a half; Ginger, one drachm; Boiling Water, a pint."

Under this form Senna may be given as a purgative, the dose being three or four ounces. It is however less grateful than the infusion of senna and tamarinds of the Edinburgh Pharmacopœia. The proportion of senna, too, appears to be considerably greater than what is necessary; and there is no propriety in preparing more of the infusion than what is required for a dose. A similar infusion, in which this is avoided, and in which cardamom seeds are substituted for ginger, has a place in the Dublin Pharmacopœia.

Infusum simaroubæ. Infusion of Simarouba. Ph. Lond.

"Take of the Bark of Simarouba bruised, half a drachm; Boiling Water, half a pint. Macerate for two hours, in a vessel lightly closed, and strain."

Simarouba yields its bitterness to water; the infusion, however, is inferior to that of quassia, and does not appear to have any particular advantage to recommend it.

Infusum tabaci. Infusion of Tobacco. Ph. Lond.

"Take of the Leaves of Tobacco, one drachm; Boiling Water, a pint. Macerate for an hour, in a vessel lightly closed, and strain."

This infusion is prepared of that strength, proper for giving tobacco under the form of enema, as a narcotic in incarcerated hernia, or to produce evacuation from the intestines, in ileus and obstinate constipation.

INFUSUM MENTHÆ COMPOSITUM. Compound Infusion of Mint. Ph. Dub.

"Take of the Leaves of Spearmint dried, two drachms; Boiling Water, as much as is sufficient to form six ounces of infusion when strained. Digest them for half an hour in a covered vessel; strain the liquor when cold, and add to it, of Refined Sugar, two drachms; Oil of Spearmint three drops, dissolved in half an ounce of compound tincture of cardamom."

This is a grateful stomachic, which may be used to obviate flatulence, or to cover the taste of unpleasant medicines.

INFUSUM VALERIANÆ. Infusion of Valerian. Ph. Dub.

"Take of the Root of Valerian, in coarse powder, two drachms; Boiling Water, seven ounces. Digest for an hour, and strain the liquor when it is cold.

Valerian is frequently taken in hysteric affections under the form of infusion, and this will afford a preparation of proper strength. Its dose is from one to two ounces.

CHAPTER VIII.

OF MUCILAGES.

THE term Mucilage, understood as denoting a particular preparation in Pharmacy, is applied to solutions of gummy matter in water, sufficiently concentrated to have a certain degree of viscidity; or to similar solutions

obtained by the maceration of water on vegetables, in which this kind of matter abounds. They are principally employed as vehicles for other substances, either to suspend powders in liquids, to diffuse oils or resinous matter in water, or to give form and tenacity to pills.

MUCILAGO AMYLI. Starch Mucilage. (Mucilago Amyli, *Phar. Lond. Dub.*)

"Take of Starch, half an ounce; Water, one pound. Rub the starch, with the water gradually added to it, then boil them for a short time."

Starch is the fecula of wheat, and though perfectly insoluble in cold water, is dissolved by boiling water, and forms a gelatinous solution. This starch-mucilage is principally used as a vehicle for giving opium under the form of enema.

MUCILAGO ASTRAGALI TRAGACANTHÆ. Mucilage of Gum Tragacanth. (Mucilag. Gum. Trag. *Ph. Dub.*)

"Take of Gum Tragacanth beat to powder, one ounce; Boiling Water, eight ounces. Macerate for twenty-four hours, and rub the gum carefully, that it may be dissolved; then strain through linen." In the Dublin Pharmacopœia, the proportions are two drachms of tragacanth to eight ounces of water.

Tragacanth is not easily dissolved in water, and, even with the aid of heat, the viscid mucilaginous liquor that is formed remains turbid and flocculent. The proportion of the gum to the water is rather large in the Edinburgh Pharmacopœia, but it is designed to form a stiff mucilage, to be used principally in making troches.

MUCILAGO MIMOSÆ NILOTICÆ. Mucilage of Gum Arabic. (Mucilago Acaciæ, *Ph. Lond.*—Mucilago Gum. Arab. *Ph. Dub.*)

"Take of Gum Arabic in powder, one part; Boiling Water, two parts. Digest with frequent agitation until the gum be dissolved; then strain through linen."

Mucilage of gum Arabic is sometimes employed as a demulcent, being the basis of the common pectoral

mixtures used in catarrh. It is more generally used as an agent in Pharmacy, to suspend in water substances insoluble in that liquid, diffuse oils in water, and for similar purposes.

CHAPTER IX.

OF DECOCTIONS.

The power of water as a solvent, is, like that of all other chemical agents, increased by heat. Hence, in general, the active matter of vegetable substances is more completely extracted by boiling them with water, than by mere infusion, either cold or warm, the residuum in the one case being found more inert than in the other.

It is not to be concluded, however, from this fact, that the decoction is proportionally more active. On the contrary, though the water extracts the active matter of the substance, it is often much injured in the operation: in few cases is the decoction equal in power to the quantity of the substance from which it is prepared; in many it is much impaired; and in some it is totally lost, the decoction itself and the residual matter being both nearly inert.

This change is often owing to the dissipation of the volatile principles of the substance operated on. All the essential oils are volatilized at the temperature of boiling water. It is evident, therefore, that substances, whose virtues depend wholly or in part on their essential oil, must be injured by this operation: for this reason, aromatics are always useless additions to decoctions; and the aromatic flavour of many active substances is also lost in this form of preparation.

But there are many cases in which the virtues of medicines are injured by decoction, in which we cannot ascribe the injury to the mere dissipation of their active principles. Opium, bark, and ipecacuan, for instance, are much

weakened by boiling in water; yet, when the operation is conducted in close vessels, so as to collect the water that is evaporated, that water is not found to be strongly impregnated with the active matter of the substance operated on. The distilled water of opium has been given to the extent of six ounces, without exerting any great narcotic effect; and the distilled water of ipecacuan, though it proves emetic, is much less so than the simple infusion. Since, then, the active matter is neither to be found in the fluid which is evaporated, nor in that which remains, it is evident that it must have been destroyed in the operation, by decomposition of the principles on which it depended. It is accordingly found that some such change is induced. When a decoction is strained, so as to be obtained transparent, and is subjected anew to boiling, it acquires a deeper colour, becomes turbid, an insipid substance being gradually formed, which is deposited. This change may be owing, either to the reaction of the elements of the vegetable matter being favoured by the humidity, and the high temperature, so that they enter into new combinations, or to the action of the air upon it imparting oxygen. There have been experiments brought in proof of this last circumstance taking place in some cases, especially in the decoction of Peruvian bark, oxygen being absorbed, combining with the extracto-resinous matter, and forming an insipid substance. This in particular is affirmed by Fourcroy. And it is farther rendered probable by the experiments of the younger Saussure, who found that extractive matter, in a humid or dissolved state, exposed to the air, was precipitated after a few days in an insoluble state, and oxygen was absorbed; carbonic acid was also formed; and he concluded, from the results he obtained, that, while part of the carbon of the vegetable matter is abstracted by the action of the oxygen of the air, part also of its oxygen and hydrogen combine and form water, so that the residual matter has an increased proportion of carbon. These changes will be favoured by a high temperature: they are those, therefore, proba-

bly that take place in decoction, and impair or destroy the powers of the vegetable substance; though it is also possible, that chemical changes may arise from the reaction of the elements of the vegetable matter itself, independent of any action of the air.

From these observations, it is evident, that decoction can seldom be a proper form for the administration of medicines. The pungency and aromatic flavour, on which part of their virtues depends, and which renders them at least more grateful, must always be impaired or lost, and their more important virtues must often be equally injured. It is accordingly a form which is not now often applied to active remedies.

Decoctions, like infusions, are extemporaneous prescriptions. They cannot be kept ready prepared, as in a few days they are injured, and run into the acetous fermentation. They can, however, be prepared much sooner than infusions; the boiling not requiring to be continued in general for more than ten or fifteen minutes. They ought to be strained while hot, as, on cooling, a portion of the dissolved matter is frequently deposited, which is as active as that which remains dissolved, and this precipitate ought to be mingled with the liquid by agitation, when the dose is to be taken.

DECOCTUM ALTHÆÆ OFFICINALIS. Decoction of Althæa.

"Take of Dried Althæa Root bruised, four ounces; Raisins freed from their seeds, two ounces; Water, seven pounds. Boil to five pounds; put aside the strained liquor until the impurities have subsided, and pour off the clear liquor."

The gummy part of vegetables is less injured by decoction than any other. In this decoction, therefore, all the powers of the althæa root are obtained, and it is under this form that it is used. The decoction is taken as a demulcent, to the extent of two or three pounds in the day, in nephritic complaints, in ardor urinæ, and sometimes in catarrh.

Decoctum anthemidis nobilis, *vulgo Decoctum Chamæmeli sive Commune.* Decoction of Chamomile, *or Common Decoction.*

"Take of the Dried Flowers of Chamomile, one ounce; Caraway Seeds bruised, half an ounce; Water, five pounds. Boil for a quarter of an hour, and strain."

This decoction is used only as an enema, and as a fomentation. When applied to the former purpose, the effect it may produce is to be ascribed principally to the water; in the second, the vegetables are not more useful, except as retaining longer the heat and moisture when applied to a part.

There is a similar preparation in the Dublin Pharmacopœia, under the name of Decoctum Chamæmeli Compositum, in which half an ounce of the flowers of chamomile and two drachms of fennel seeds are boiled in a pound of water. It is designed for the same purposes; and as an enema it is rendered more active, in the preparation named Enema Catharticum, by dissolving in ten ounces of it an ounce of manna, and half an ounce of sulphate of magnesia, adding an ounce of olive oil. When to this are added two drachms of tincture of assafœtida, it forms the preparation of the same Pharmacopœia named Enema Foetidum.

Decoctum cinchonæ officinalis, *vulgo Decoctum Corticis Peruviani.* Decoction of Peruvian Bark. (Decoct. Cinchonæ, *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, one ounce; Water, one pound and a half. Boil for ten minutes in a covered vessel, and strain the liquor while hot."

The resino-extractive matter of Peruvian bark is altered by decoction; hence the reason of the directions given in the Pharmacopœia under this preparation, the boiling not being continued longer than ten minutes, as in this time the active matter, it is supposed, will be as fully extracted as it would be by longer boiling, and the decoction being performed in a covered vessel to exclude as much as possible the access of the air, to the chemical agency of which the change in the

extractive matter has been supposed owing. The liquor is ordered to be strained while hot, as it holds dissolved a larger portion of the resinous matter than it can retain in solution when cold. Hence, after having been strained, it becomes turbid as it cools, depositing a reddish precipitate. This ought to be mixed with it by agitation when the dose is to be taken. The addition of a little acid causes it to remain dissolved, and where this can be prescribed with propriety it may be employed.

Decoction of bark is used in those cases which require the free administration of the remedy, but in which in substance it sits uneasy on the stomach. The dose is two or three ounces, taken as often as the stomach will receive it.

DECOCTUM DAPHNES MEZEREI. Decoction of Mezereon.

"Take of the Bark of the Root of Mezereon, two drachms; of Liquorice Root bruised, half an ounce; Water, three pounds. Boil with a gentle heat to two pounds, and strain."

A compound decoction, prepared from guaiac wood, sarsaparilla, sassafras, mezereon and liquorice, had been highly celebrated, under the name of Lisbon Diet Drink, for its efficacy in the treatment of symptoms connected with syphilis, particularly thickening of the ligaments, affections of the bones and periosteum, and obstinate ulceration. Dr. Russell, from a series of experiments, concluded, that the mezereon is the ingredient on which its activity depends; and this decoction, in which the liquorice serves merely to cover the pungency of the mezereon, has been substituted for the more complicated composition. It is used in the same cases, sometimes also in cutaneous affections, the dose being from four to six ounces twice or thrice a-day. In a large dose, it is liable to excite nausea.

DECOCTUM GEOFFRÆÆ INERMIS. Decoction of Cabbage-Tree Bark.

"Take of Cabbage-Tree Bark in powder, one ounce; Water, two pounds. Boil with a gentle heat to one pound, and strain."

This decoction is the form under which this medicine has been usually administered, the bark in substance being too violent in its operation. In the West India Islands, the decoction has been used as a very effectual remedy in worms, especially the lumbrici. The dose given is two ounces to an adult; if this occasion nausea, griping, or tenesmus, which it sometimes does, these symptoms are relieved by a dose of castor oil. In this country it has not been much employed.

DECOCTUM GUAJACI OFFICINALIS COMPOSITUM, *vulgo Decoctum Lignorum.* Compound Decoction of Guaiac.

"Take of Guaiac Wood Shavings, three ounces; Raisins, two ounces; Sassafras Root cut, Liquorice Root bruised, of each one ounce; Water, ten pounds. Boil the water with the guaiac wood and raisins, on a gentle fire, to five pounds, adding the roots towards the end of the boiling; then strain without expression."

This decoction derives its virtues principally from the guaiac. It acts as a diaphoretic, and has been used in cutaneous diseases, and in chronic rheumatism, taken in the quantity of a pound twice or thrice a-day. It has also been employed in the treatment of obstinate venereal symptoms, especially as an auxiliary to mercury.

DECOCTUM HORDEI DISTICHI. Decoction of Barley. (Decoct. Hordei, *Ph. Lond. Dub.*)

"Take of Pearl Barley, two ounces; Water, five pounds. First wash off with cold water the flour adhering to the barley; then boil the barley for a short time with about half a pound of water, to extract the colouring matter. This being rejected, put the barley thus purified into five pounds of boiling water. Boil this to one half, and strain."

This decoction is never prepared in the shops. It is, however, very extensively used as a diluent in febrile diseases; and as it is of some importance that it should be grateful, it has been judged proper to give directions how it may be best prepared. Similar directions are given by the London and Dublin Colleges; and they have also inserted another composition, under the name Decoctum Hordei Compositum, in which raisins, figs, and liquorice root are boiled with the barley,—additions which probably render it rather cloying to the taste and stomach, and from which no great advantage can be derived.

Decoctum polygalæ senegæ. Decoction of Seneka. (Decoct. Senegæ, *Ph. Lond.*)

"Take of Seneka Root, one ounce; water, two pounds. Boil to sixteen ounces, and strain."

Under the form of decoction, senega has been employed as an expectorant in pneumonic affections, attended with accumulation of mucus in the bronchiæ, and as a diaphoretic in chronic rheumatism; and though not much used, a formula similar to this has been introduced into the last edition of the London Pharmacopœia. The dose is two or three ounces three or four times a-day.

Decoctum smilacis sarsaparillæ. Decoction of Sarsaparilla. (Decoct. Sarsaparillæ, *Ph. Lond. Dub.*)

"Take of Sarsaparilla Root cut, six ounces; Water, eight pounds. Digest for two hours, in a temperature of about 195°, then take out the root and bruise it; put it again into the liquor, and boil it with a gentle fire to two pounds; then express it, and strain."

The fecula, which is the principle in which the power of sarsaparilla resides, is not easily extracted merely by boiling the root. This is the reason of the particular directions to digest the root first, and then bruise it; it is thus softened, and yields its soluble matter more readily in the subsequent boiling. This decoction is the

form under which sarsaparilla is always given, its dose being from a pint to a quart in the course of the day. It has been used in venereal cases, either to promote the action of mercury, or to remove symptoms which have remained after a long continued mercurial course. Dr. Fordyce celebrated its efficacy in very high terms, in giving relief in nocturnal pains, removing eruptions, and as being the best restorative in the emaciation and debility remaining after the long continued use of mercury. Its efficacy in these affections has probably been overrated, and the opinion is perhaps more just which regards it only as belonging to the nutrientia, or as a mere demulcent. The benefit sometimes derived from it has perhaps as frequently arisen from the exhibition of mercury too long continued having been suspended, as from any action of the sarsaparilla itself. The decoction has been used with considerable advantage as a demulcent in dysuria and morbid irritability of the bladder, occasioning incontinence of urine.

A FEW Decoctions, peculiar to the London and Dublin Pharmacopœias, remain to be noticed.

DECOCTUM ALOES COMPOSITUM. Compound Decoction of Aloes. Pharm. Lond.

"Take of Extract of Liquorice, half an ounce; Subcarbonate of Potash, two scruples; Extract of Aloes, Myrrh in powder, Saffron, of each one drachm; Water, a pint. Boil down to twelve fluid ounces, and strain, then add of Compound Tincture of Cardamoms, four fluid ounces."

The gum-resinous substances in this decoction are retained in solution, partly by the solvent power of the water, and partly by the action of the alkali; and by the addition of the spiritous tincture, any spontaneous decomposition will be more effectually prevented. The composition is newly introduced into the Pharmacopœia,

and is said to be analogous to one in use, under the name of Beaume de Vie. It is one which must be very nauseous, and it is not obvious what peculiar advantage can belong to it. As a stimulating aperient, it may be given in the dose of two ounces.

Decoctum cydoniæ. Decoction of Quince Seeds. Pharm. Lond.

"Take of Quince Seeds, two drachms; Water, a pint. Boil with a gentle heat for ten minutes, then strain."

Quince seeds abound with mucilage, which is extracted easily by boiling in water. It is liable to spontaneous decomposition, and having no peculiar advantage is little employed.

Decoctum dulcamaræ. Decoction of Woody Nightshade. Pharm. Lond.

"Take of the Stalks of Woody Nightshade cut, one ounce; Water, a pint and a half. Boil to a pint, and strain."

Under this form the woody nightshade may be employed; but there seems no propriety in giving a formula for its preparation, more than any other vegetable substance, which may be given under the same or any similar form.

Decoctum lichenis. Decoction of Iceland Liverwort. Pharm. Lond. and Dub.

"Take of Liverwort, one ounce; Water, a pint and a half. Boil down to one pint, and strain." In the Dublin Pharmacopœia, a digestion of the water on the lichen for two hours is ordered, and then boiling for a quarter of an hour.

The fecula or mucilage of the lichen is extracted by water by boiling, and it is under this form of decoction that it has been employed as a demulcent, and a mild nutritious substance easy of digestion.

DECOCTUM MALVÆ COMPOSITUM. Compound Decoction of Mallow.

"Take of Mallow dried, one ounce; Chamomile Flowers dried, half an ounce; Water, a pint. Boil them for a quarter of an hour, and strain."

This decoction is designed for the same purpose as the decoction of chamomile, that of serving as a vehicle for fomentations and enemas; and the same observation applies to it.

DECOCTUM PAPAVERIS. Decoction of Poppy. Pharm. Lond.

"Take of the Capsules of the White Poppy cut, four ounces; Water, four pints. Boil for a quarter of an hour, and strain."

The decoction of the capsules of the poppy has been frequently used as an anodyne fomentation, and is now, with propriety, introduced as an officinal preparation.

DECOCTUM QUERCUS. Decoction of Oak Bark. Ph. Lond.

"Take of Oak Bark, one ounce; Water, two pints. Boil down to a pint, and strain."

The astringency of the oak bark is extracted by boiling in water; and the decoction is the common form under which it is used, being applied externally in hæmorrhoids, prolapsus ani, leucorrhœa, and profuse menorrhagia.

DECOCTUM SARSAPARILLÆ COMPOSITUM. Compound Decoction of Sarsaparilla. *Ph. Lond. Dub.*

"Take of the Simple Decoction of Sarsaparilla boiling, four pints; Sassafras Wood cut, Raspings of Guaiac Wood, Liquorice Root bruised, of each one ounce; Mezereon, three drachms. Boil for a quarter of an hour." In the formula of the Dublin Pharmacopœia, the proportion of the mezereon, the active ingredient, is only one drachm to three pints of water.

This is nearly the same composition as the Lisbon Diet Drink, celebrated, as has been already remarked, in the treatment of secondary venereal affections, or

symptoms appearing during a protracted mercurial course. The efficacy of the preparation has been supposed to depend principally on the mezereon, yet the other substances may add something to its power, and it is perhaps preferable to adhere to the original composition of remedies of this kind, so far as this is unexceptionable. Its dose is four or six ounces, three or four times a-day.

Decoctum ulmi. Decoction of Elm. *Ph. Lond. Dub.*

"Take of the Fresh Bark of the Elm bruised, four ounces; Water, four pints. Boil down to two pints, and strain."

This decoction has been recommended in cutaneous eruptions, but is little used. Its dose is four ounces.

Decoctum veratri. Decoction of White Hellebore. Pharm. Lond.

"Take of White Hellebore Root beat, an ounce; Water, two pints; Rectified Spirit, two fluid ounces. Boil the white hellebore root with the water, down to a pint, and strain; when cold, add the spirit."

This decoction is employed as an external application in some cutaneous diseases, principally in psora. It is a much less unpleasant application than the sulphur ointment, and is occasionally successful.

Decoctum digitalis. Decoction of Foxglove. Ph. Dub.

"Take of the Leaves of Foxglove dried; one drachm; Water, as much as may be sufficient to afford eight ounces of the strained decoction. Place the vessel on a gentle fire, and remove it when the liquor begins to boil. Digest for a quarter of an hour, and strain."

Water extracts sufficiently the active matter of the leaves of foxglove by infusion, and there is therefore no necessity for boiling it upon them. The decoction in this preparation is, however, so slight, than it cannot

alter the powers of the medicine, and it may be regarded as analogous to the infusion of the other Pharmacopœias. The proportions too are the same, and it may therefore be given in the same dose.

CHAPTER X.

SYRUPI.—SYRUPS.

Syrups are saturated solutions of sugar in water, in watery infusions, or in vegetable juices. They are seldom very active medicines; and are more commonly employed to render others agreeable, and in pharmacy to communicate peculiar forms.

The proportion of sugar in syrups is generally two parts to one of the fluid; if it is more than this, the solution is disposed to crystallize; if less, it is liable to ferment, and become acescent. Refined sugar ought always to be employed. It is to be melted in the liquid by a gentle heat, and any impurities which collect on its surface when boiling are to be removed. The syrup ought to be kept in a cool place, to prevent the fermentation, which is favoured by a high temperature. The London College have given the general direction of keeping them at a temperature not higher than 55°.

Syrupus simplex *sive communis*. Simple *or Common* Syrup.

"Take of Refined Sugar beat to powder, fifteen parts; Water, eight parts. Dissolve the sugar with a gentle heat, and boil a little so as to form a syrup."

This solution of sugar is used merely to communicate sweetness of taste, or for the pharmaceutical purposes to which syrups are applied.

SYRUPUS ACIDI ACETOSI.

"Take of Acetous Acid (Vinegar,) two pounds and a half; Refined Sugar, three pounds and a half. Boil so as to form a syrup."

This acidulous syrup being sufficiently pleasant, may enter into mixtures in which it cannot occasion any chemical decomposition. It is, however, so rarely employed, that being liable to decomposition on keeping, it is not found in the shops.

SYRUPUS ALTHÆÆ OFFICINALIS. Syrup of Althæa. (Syrup. Althææ, *Ph. Lond.*)

"Take of Fresh Althæa Root cut, one pound; Water, ten pounds; Refined Sugar, four pounds. Boil the water with the root to one half, and expressing it strongly, strain. Put aside the strained liquor, that the impurities may subside, and to the purified liquor add the sugar; then boil it so as to form a syrup."

The water dissolving the mucilage of the Althæa, less than the usual proportion of sugar is required to give it the consistence of a syrup. This mucilage is supposed to give the syrup some demulcent power; this, however, must be very trivial, and it renders it more liable to spontaneous decomposition.

SYRUPUS AMOMI ZINGIBERIS. Syrup of Ginger. (Syrup. Zingib. *Ph. Lond. Dub.*)

"Take of the Root of Ginger beat, three ounces; Boiling Water, four pounds; Refined Sugar, seven pounds and a half. Macerate the root in the water, in a close vessel, for twenty-four hours; and to the strained liquor, add the beat sugar, so as to make a syrup."

This syrup is impregnated with the aromatic flavour and pungency of the ginger, which renders it sufficiently grateful.

SYRUPUS CITRI AURANTII. Syrup of Orange-Peel. (Syrup. Aurant. *Ph. Lond. Dub.*

"Take of the Fresh Outer Rind of the Orange, six ounces; Boiling Water, three pounds; Refined Sugar, four pounds. Macerate the rind in water for twelve hours; then to the strained liquor add the sugar beat to powder, and, by the application of a gentle heat, form a syrup."

This syrup, like the former, is used on account of its grateful aromatic flavour. The proportion of sugar in it is too small, especially as it is necessary to avoid any dissipation of the water by boiling, to prevent the loss of the flavour of the orange-peel.

SYRUPUS CITRI MEDICÆ, *olim Syrupus Limonum.* Syrup of Lemon. (Syr. Limon. *Ph. Lond. Dub.*)

"Take of the Juice of Lemons strained, after the impurities have subsided, three parts; Refined Sugar, five parts; dissolve the sugar so as to form a syrup."

This is a pleasant syrup, used to sweeten and acidulate mixtures, especially those of the mucilaginous kind: there are others, into the composition of which it cannot properly enter, from the chemical agency of the acid.

SYRUPUS COLCHICI AUTUMNALIS. Syrup of Colchicum.

"Take of the Fresh Root of Colchicum, cut into small pieces, one ounce; Acetous Acid, sixteen ounces; Refined Sugar, twenty-six ounces. Macerate the root in the acid for two days, shaking the vessel occasionally; then expressing it gently, strain it; to the strained liquor add the sugar in powder, and boil a little, so as to form a syrup."

Colchicum has been used under this form as a diuretic in dropsy, the dose being from half an ounce to an ounce. The root itself being little employed in modern practice, this syrup is scarcely ever prescribed.

SYRUPUS DIANTHI CARYOPHILLI. Syrup of Clove July-Flower. (Syr. Caryoph. R. *Ph. Dub.*)

"Take of the Fresh Petals of the Clove July-Flower freed from the heels, one pound; of Boiling Water, four pounds; of Refined Sugar, seven pounds. Macerate the petals in the water for twelve hours; then to the strained liquor add the sugar in powder; which dissolve with a gentle heat, so as to form a syrup."

This syrup derives from the flowers a rich red colour, and an agreeable flavour, and from these qualities is frequently used in mixtures.

SYRUPUS PAPAVERIS SOMNIFERI. Syrup of White Poppy. (Syr. Papav. *Ph. Lond. Dub.*)

"Take of the Dried Capsules of the White Poppy, freed from the seeds, two pounds; Boiling Water, thirty pounds; Refined Sugar, four pounds. Macerate the capsules cut, in the water for twelve hours; then boil until a third part only of the liquor remain; and pressing it strongly, strain; boil down the strained liquor to one half, and again strain; lastly, the sugar being added, boil a little, so as to form a syrup."

The active matter of the capsule of the poppy is extracted by water by decoction, and, by boiling down the liquor, as directed in this formula, and in those of the other Pharmacopœias, is obtained in a more concentrated state, whether with any diminution of its powers from the continued decoction has not been ascertained. The syrup has a considerable narcotic power; and the taste being agreeable, and the dose easily regulated, it is convenient for exhibition to children, a drachm being given to a child a year old. From the supposition that it is uncertain in strength, it has been proposed to substitute for it a composition of simple syrup and tincture of opium; but it is not certain if the operation of this is exactly the same, and there is some risk, that from spontaneous decomposition, part of the active matter of the opium may be precipitated.

SYRUPUS RHAMNI CATHARTICI. Syrup of Buckthorn. (Syrup. Rhamn. *Ph. Lond.*)

"Take of the Clarified Juice of ripe Buckthorn Berries, two parts; Refined Sugar, one part. Boil, so as to form a syrup."

The juice of the buckthorn is best preserved by being made into a syrup, and it is under this form that it has been used as a cathartic, the dose to an adult being an ounce, or an ounce and a half. Its operation, however, is unpleasant, and the preparation has nothing to recommend it. In the composition of the London Pharmacopœia, ginger and Jamaica pepper are added, which will communicate a pleasant flavour, and may obviate the griping it is liable to produce.

SYRUPUS ROSÆ CENTIFOLIÆ. Syrup of Damask or Pale Rose. (Syrup. Rosæ, *Ph. Lond.*)

"Take of the Fresh Petals of the Damask Rose, one pound; Boiling Water, four pounds; Refined Sugar, three pounds. Macerate the petals in water for twelve hours; then to the strained liquor add the sugar, and boil, so as to form a syrup."

The agreeable flavour of the rose is entirely lost in this syrup; but it has a very weak purgative power, and is sometimes from this quality given to infants in a dose of two or three tea-spoonfuls.

SYRUPUS ROSÆ GALLICÆ. Syrup of Red Rose.

"Take of the Dried Petals of the Red Rose, seven ounces; Boiling Water, five pounds; Refined Sugar, six pounds. Macerate the petals in water for twelve hours; then boil them a little, and strain: to the strained liquor add the sugar, and again boil, so as to form a syrup."

Water, by infusion, extracts the slight astringency and the colour of the rose; the astringency has been supposed to be at least such as to counteract the laxative quality of the sugar, and it is usually this syrup that enters into the composition of astringent mixtures.

SYRUPUS SCILLÆ MARITIMÆ. Syrup of Squill.

"Take of the Vinegar of Squill, two pounds; Refined Sugar, three pounds and a half. Dissolve the sugar with a gentle heat, so as to form a syrup."

This is a syrup of considerable power, the active matter of squill being dissolved by vinegar, and being little injured in forming it into a syrup. It is the form under which squill is usually given as an expectorant, in a dose of one or two drachms, and it is often added to combinations of expectorant remedies. It is also given to children as an emetic, especially in pertussis, the operation of it being sometimes promoted by the addition of a little ipecacuan or antimonial wine.

SYRUPUS TOLUIFERÆ BALSAMI, *vulgo Syrupus Balsamicus*. Syrup of Tolu Balsam. (Syrup. Tolut. *Ph. Lond.*)

"Take of Common Syrup, two pounds; Tincture of Tolu Balsam, one ounce. With the syrup newly prepared, and removed from the fire, when it has nearly cooled, mix the tincture gradually with agitation."

This is an economical mode of preparing this syrup; but the old method, still retained in the London Pharmacopœia, of boiling Balsam of Tolu in water in a close vessel, and afterwards forming the liquor into a syrup by the addition of sugar, affords a more grateful composition, the syrup being impregnated with the odour of the balsam, without its resinous matter being diffused through it, which, as prepared by the formula of the Edinburgh College, renders it white and turbid. The syrup is used merely on account of its flavour, and to many this is rather disagreeable. On the supposition of tolu balsam being an expectorant, it sometimes enters into the composition of mixtures used in catarrh.

SYRUPUS VIOLÆ ODORATÆ. Syrup of Violet. (Syrup. Violæ, *Ph. Dub.*)

"Take of the fresh flowers of the Sweet-scented Violet, one pound; Boiling Water, four pounds; Refined Sugar, seven pounds and a half. Macerate the

flowers in water for twenty-four hours in a covered glass or earthen vessel. Then strain, without expression, and to the strained liquor add the beat sugar, so as to form a syrup."

This syrup has a fine blue colour, which is, however, lost on keeping. It is a very gentle laxative, and as such is given to infants in a dose of one or two tea-spoonfuls.

It remains to notice those few syrups which have exclusively a place in the London or Dublin Pharmacopœia.

Syrupus croci. Syrup of Saffron. Ph. Lond.

"Take of Saffron, an ounce; Boiling Water, a pint. Macerate the saffron in the water for twelve hours, in a vessel lightly closed; then strain the liquor, and add the sugar to it."

This syrup is employed in mixtures merely on account of its colour.

Syrupus mori. Syrup of Mulberry. Ph. Lond.

"Take of Mulberry Juice strained, a pint; Refined Sugar, two pounds. Dissolve the sugar in the juice in the manner directed with regard to syrup."

The syrups of several acidulous fruits had formerly a place in the London Pharmacopœia. This is retained as one of the most grateful.

Syrupus Rhoeados. Syrup of Red Poppy. Ph. Lond. (Syr. Papav. Errat. *Ph. Dub.*)

"Take of the Recent Petals of the Red Poppy, one pound; Boiling Water, a pint and two fluid ounces; Refined Sugar, two pounds and a half. To the water heated by a water-bath, add the petals of the red poppy gradually, stirring them occasionally, then having removed the vessel, macerate for twelve hours; press out the liquor, and put it aside, that the impurities may

subside; lastly, add the sugar in the manner directed with regard to common syrup."

This syrup is valued only on account of the fine red colour which it receives from the petals of the flower.

SYRUPUS SENNÆ. Syrup of Senna. *Ph. Lond. Dub.*

"Take of Senna Leaves, one ounce; Bruised Fennel Seeds, one drachm; Manna, Refined Sugar, of each one pound; Boiling Water, one pint. Macerate the senna leaves and the fennel seeds in water for twelve hours. Strain the liquor, and mix with this the manna and sugar." The directions in the Dublin Pharmacopœia are similar, except that the proportion of senna is only half an ounce, and the fennel seeds are omitted.

This is designed as a purgative syrup for children, and will answer this purpose perfectly well; though the infusion of senna, sweetened with sugar, which is in common use, being of extemporaneous preparation, is perhaps preferable.

SYRUPUS ALII. Syrup of Garlic. Ph. Lond.

"Take of the Roots of Garlic, cut, one pound; of Boiling Water, two pounds. Macerate the garlic in the water for twelve hours in a covered vessel, and form a syrup, by adding sugar to the strained liquor."

Garlic has been employed as an expectorant in some forms of catarrh and dyspnœa, under the form of syrup. It has perhaps, however, no such power as to entitle it to a place as an officinal preparation.

SYRUPUS OPII. Syrup of Opium. Ph. Lond.

"Take of the Watery Extract of Opium, eighteen grains; Boiling Water, eight ounces. Macerate them together until the opium be dissolved; then add sugar, so as to form a syrup."

This is designed as a substitute for the syrup of poppy; and as the watery extract of opium, not the opium in substance, is dissolved, it may not be liable to the objection of any portion being precipitated from

decomposition. It is not altogether certain, however, whether, in the preparation of the watery extract, (to be afterwards noticed), the narcotic power of the opium is not impaired, and, therefore, whether this preparation from it will be always of uniform strength. An ounce of the syrup contains about one grain of the watery extract; its strength, therefore, will be similar to the medium strength of the syrup of poppy.

MELLITA.—MEDICATED HONEYS.

Honey has been employed instead of saccharine matter in some pharmaceutical preparations. Combined with vinegar, either alone or with the impregnation of the active matter of vegetables, the kind of composition named Oxymel is formed. Combined merely with infusions of vegetable substances, it forms what are more exclusively named Medicated Honeys. As these preparations have no particular advantage over syrups, and as honey, from idiosyncrasy, produces unpleasant effects on some individuals, they have been rejected by the Edinburgh College. A few, however, retain a place in the London and Dublin Pharmacopœias.

Mel despumatum. Clarified Honey. Ph. Lond.

"Liquefy honey in a water-bath, then remove the scum."

Honey, as it is expressed from the comb, is liable to contain wax and other impurities. When the honey is liquefied, these, in a great measure, separate and rise to the surface, so as to be easily removed. The honey thus purified is ordered in the other preparations into which honey enters.

Mel boracis. Honey of Borax. Ph. Lond.

"Take of Borax in powder, a drachm; Clarified Honey, an ounce." Mix them.

In this composition, honey is useful, as giving the proper consistence. It is designed as an application in aphthous affections of the tongue and fauces, the borax giving a sense of coolness, and removing the foul crust.

MEL ROSÆ. Honey of Rose. *Ph. Lond. Dub.*

"Take of the Dried Petals of the Red Rose, four ounces; Boiling Water, three pints; Clarified Honey, five pints. Macerate the petals in the water for six hours, then to the strained liquor add the honey, and boil it down in a water-bath to the proper consistence."

This preparation is similar to the syrup of the red rose, and may be applied to the same purposes.

OXYMEL. Oxymel. *Ph. Lond. Dub.*

"Take of Purified Honey, two pounds; Acetic Acid (Distilled Vinegar) one pound. Boil them in a glass vessel, on a slow fire, to the proper consistence."

This has long been in use as a remedy in catarrhal affections, and is also the basis of a cooling detergent gargle.

OXYMEL SCILLÆ. Oxymel of Squill. *Ph. Lond. Dub.*

"Take of Clarified Honey, three pounds; Vinegar of Squill, two pounds. Boil in a glass vessel, over a slow fire, to a proper consistence."

Under this form squill has been employed, principally as an expectorant. Its dose is one or two drachms.

OXYMEL COLCHICI. Oxymel of Colchicum. Ph. Dub.

"Take of the Fresh Root of Colchicum cut into thin slices, one ounce; Distilled Vinegar, one pint; Clarified Honey, two pounds. Macerate the colchicum with the vinegar for two days, in a glass vessel; then strain the liquor pressed out strongly from the root, and add the honey. Lastly, boil the mixture, stirring it frequently with a wooden spoon, to the consistence of a syrup."

This is essentially the same with the syrup of colchi-

cum already noticed; nor can it derive any advantage from honey being used in its preparation.

Oxymel æruginis. Oxymel of Verdigrease. Ph. Dub. (Liniment. Æruginis, *Ph. Lond.*)

"Take of Prepared Verdigrease, one ounce; Vinegar, seven ounces; Clarified Honey, fourteen ounces. Dissolve the verdigrease in the vinegar, and strain it through linen, then add the honey, and boil the mixture to a proper thickness."

Under this form, verdigrease has been applied as a stimulant and escharotic to foul ulcers.

CHAPTER XI.

VINA.—WINES.

Wine is capable, by infusion, of extracting several of the proximate principles of vegetable substances. From the portion of alkohol it contains, it dissolves in some measure their resin, extract and essential oil; its watery part dissolves their gum or mucilage; and being milder and more pleasant to the taste than diluted alkohol, it is sometimes preferred to it as a solvent; hence Medicated Wines have long been in use, and some of them are still retained in the Pharmacopœias.

It cannot be said, however, to be well adapted to this use. Wine itself, when not carefully excluded from the air, is apt to decompose and become acescent; and, when it holds vegetable matter in solution, it appears to be still more liable to suffer this change. This has been established by the researches of Parmentier; and the greater number of medicated wines, if kept for any length of time, become medicated vinegars. Now this change may modify the powers of the dissolved matter; and in some cases, where the wine is taken in a considerable dose, must prove hurtful to the stomach, espe-

cially in dyspeptic affections. Accordingly, few of the medicated wines are now employed. The spontaneous decomposition to which these wines are liable, is sometimes attempted to be obviated by the addition of a portion of alkohol, but this is attended only with imperfect success.

From the tartaric acid which some wines contain, they are capable of acting chemically on some of the metals, and are better solvents of some metallic preparations than water or alkohol.

VINUM ALOES SOCOTORINÆ, *vulgo Tinctura Sacra.* Wine of Socotorine Aloes. *Sacred Tincture.* (Vinum Aloes, *Ph. Lond. Dub.*)

"Take of Socotorine Aloes, reduced to powder, one ounce; Lesser Cardamom Seeds, Ginger Root, of each bruised, one drachm; Spanish White-Wine, two pounds. Digest for seven days, shaking frequently, and strain." In the Dublin and London Pharmacopœias, the proportion is an ounce of aloes to a pound of the medicated wine; and the solvent is not pure wine, but wine with the addition of a third part of diluted alkohol.

Aloes is entirely soluble in wine; so that in this preparation all its virtues are obtained, and from the presence of the resinous matter of the aloes, it is not liable to decomposition. It is a stimulating cathartic, which has long been in use under the name of Sacred Tincture. It produces its full effect in the dose of one ounce. In a dose of one or two drachms, it is given to excite the action of the intestines and neighbouring organs, in dyspepsia, amenorrhœa and similar affections.

VINUM GENTIANÆ COMPOSITUM, *vulgo Vinum Amarum.* Compound Gentian Wine.

"Take of Gentian Root, half an ounce; Peruvian Bark, one ounce; Orange-Peel dried, two drachms; Canella bark, one drachm; Diluted Alkohol, four ounces; Spanish White-Wine, two pounds and a half. On the root and barks cut and bruised, pour first the diluted alkohol; and after twenty-four hours, add the wine. Then macerate for seven days, and strain."

This wine is designed as a stomachic; and has been regarded as preferable to the tincture of similar composition, as being more mild and grateful, and therefore better for continued use; but from its tendency to become acescent, it is not well adapted to administration in dyspepsia. Its dose is six drachms.

VINUM IPECACUANHÆ. Ipecacuan Wine. (Vinum Ipecacuanhæa, *Ph. Lond. Dub.*)

"Take of Ipecacuan Root bruised, one ounce; Spanish White-Wine, fifteen ounces. Macerate for seven days, and strain through paper."

Wine extracts sufficiently the active matter of ipecacuan, and covers its taste and flavour, while it is less pungent than diluted alkohol. This wine is often used as an emetic, especially to children. Its dose is one ounce to an adult, one drachm to a child a year old.

VINUM NICOTIANÆ TABACI. Tobacco Wine.

"Take of the leaves of Tobacco, one ounce; Spanish White-Wine, one pound. Macerate for seven days, and strain through paper.

Under this form, Tobacco has been used as a diuretic in dropsy. The dose is thirty drops, gradually increased to sixty or eighty twice a-day. It is liable, however, to excite sickness in this large dose, and in a smaller dose often fails in its diuretic effect.

VINUM RHEI PALMATI. Rhubarb Wine.

"Take of the Root of Rhubarb cut, two ounces; Canella Bark bruised, one drachm; Diluted Alkohol, two ounces; Spanish White-Wine, fifteen ounces. Macerate for seven days, and strain through paper."

Wine extracts the active matter of rhubarb, and this medicated wine operates as a purgative, in a dose from half an ounce to an ounce. The tincture is in general to be preferred to it, as more uniform, and not liable to decomposition.

VINUM OPII. Wine of Opium. Ph. Lond.

"Take of Extract of Opium, an ounce; Cinnamon Bark bruised, Cloves bruised, each, one drachm; Wine a pint. Macerate for eight days, and strain."

Wine appears to dissolve sufficiently the active matter of opium, and has often been used as a menstruum. With the addition of aromatics, it formed the liquid laudanum of Sydenham, and was at one time an officinal preparation in the Pharmacopœias, though afterwards excluded, to give place to the simple tincture of opium. It is now restored by the London College, as it had still continued in use, and is supposed to have some advantages over the tincture. It is nearly of the same strength. Vinegar impairs the narcotic power of opium, hence if this medicated wine were liable to acescency, it might be regarded as an uncertain preparation, but it is possible that the resino-extractive matter of the opium and the aromatics may counteract any spontaneous decomposition.

VINUM FERRI. Wine of Iron. Ph. Dub.

"Take of Iron Wire in small pieces, four ounces; White Rhenish Wine, four pints. Sprinkle the pieces of iron with a little of the wine, and expose them to the air, until they are covered with rust; then add the remaining wine: digest for seven days, shaking the vessel occasionally, and lastly strain the wine."

The iron being oxidated by the joint action of the wine and the atmospheric air, a portion of the oxide is dissolved by the tartaric acid of the wine. The chalybeate impregnation must, however, be variable, according to the acidity of the wine, and it is therefore perhaps preferable to employ a preparation of more uniform strength.

CHAPTER XII.

ACETA.—VINEGARS.

Vinegar is generally capable of dissolving all those proximate principles of vegetables which are soluble in water, and with regard to some substances its acid appears farther to increase its solvent power. But, at the same time, it very often modifies their medicinal qualities, either by the chemical changes it occasions, or more generally, perhaps, by the action it exerts on the stomach. Hence there is only one medicated vinegar of any importance,—the Vinegar of Squill; the active matter of this root being dissolved by it, and appears to suffer no alteration. The activity of colchicum appears to reside in a similar acrid matter, and it also affords a medicated vinegar; of less importance, however, as the colchicum itself is little employed. As a solvent of camphor, the concentrated acetic acid is also used in one preparation.

Acetum aromaticum. Aromatic Vinegar.

"Take of the dried tops of Rosemary; the dried leaves of Sage, of each four ounces; dried Lavender Flowers, two ounces; Cloves, two drachms; distilled Acetous Acid, eight pounds. Macerate for seven days, and strain the expressed liquor through paper."

This is an improved formula for a preparation which has long had a place in the different Pharmacopœias, under the name of Acetum Prophylacticum, as an antiseptic and preservative against the operation of contagion. From the impregnation of the vinegar with the flavour of the aromatic vegetables, it is a grateful perfume, but it is weak, and its odour is very soon impaired.

ACIDUM ACETOSUM CAMPHORATUM. Camphorated Acetous Acid. (Acid. Aceticum Camph. *Ph. Dub.*)

"Take of the stronger Acetous Acid, six ounces; Camphor, half an ounce. Rub the camphor with a little alkohol into powder, which put into the acid, that it may be dissolved."

Camphor is soluble in the concentrated acetic acid, and the solution has an odour highly fragrant and pungent. It has been used as a stimulating perfume, more grateful than the common odoriferous essences. It forms what is named Aromatic Spirit of Vinegar. The preparation of the Pharmacopœia, however, especially that of the Edinburgh College, is inferior in pungency, owing to a weaker acetic acid being employed.

ACETUM SCILLÆ MARITIMÆ. Vinegar of Squill. (Acetum Scillæ, *Ph. Lond. Dub.*)

"Take of Squill Root dried, two ounces; distilled Acetous Acid, two pounds and a half; Alkohol, three ounces. Macerate the squill with the acetous acid for seven days: express the acid; to which add the alkohol; and when the impurities have subsided, pour off the liquor." The London College order a pound of squill root, recently dried, to six pints of vinegar, and half a pint of proof spirit,—a proportion of it, either unnecessarily large, or which must afford a preparation much stronger than what has been in common use.

Vinegar appears to dissolve completely the active matter of squill, without much impairing its powers: the addition of the alkohol is designed to counteract any spontaneous decomposition to which the vinegar might be liable. Under this form, squill is generally employed as an expectorant, the dose being one drachm; or more usually indeed in the form of the syrup, prepared from this medicated vinegar.

ACETUM COLCHICI. Vinegar of Meadow Saffron. Ph. Lond.

"Take of the fresh Root of Meadow Saffron cut, one ounce; Distilled Vinegar, a pint; Proof-Spirit, a fluid ounce. Macerate the root with the vinegar, in a close glass vessel, for twenty-four hours; then press it out, and put it aside, that the impurities may subside; lastly, add the spirit to the clear liquor."

Colchicum bears a considerable resemblance to squill, and its active matter is so far similar, that it appears to be dissolved by vinegar, without its powers being altered. It has been given as a diuretic, either under this form, or made into an oxymel, by the addition of honey; but in modern practice it is little employed.

CHAPTER XIII.

TINCTURÆ.—TINCTURES.

TINCTURES are solutions usually of vegetable, sometimes, however, of animal, and even of mineral substances in spiritous liquors. The solvent may be alkohol either pure, diluted with water, or impregnated with ammonia or ether. Alkohol dissolves the resin, camphor, and essential oil of plants: it is more particularly employed as the menstruum for substances purely resinous, or whose virtues reside in a resin. Where a portion of gum is mingled with the resin, or where tannin or extractive matter is the active principle, diluted alkohol is the proper solvent: it in general dissolves the active matter of all entire vegetable substances, as the bark, leaves, flowers; and wherever it can be properly applied, it is preferable to pure alkohol, as more economical and less pungent. Alkohol, impregnated with ammonia, is employed only in forming tinctures of a few

substances, with the medicinal operation of which, ammonia is supposed tocoincide.

Tinctures usually contain the active matter of the substances from which they are prepared, in a more concentrated state than infusions or decoctions, the power of the solvent being greater; hence they require to be given only in a small dose; and the power of the solvent, which is otherwise considerable, may be neglected. They have the still more important advantage of not being liable to spontaneous decomposition; the affinities of the elements of vegetable matter, whence new combinations are established, which are favoured by water, being counteracted by alkohol; and hence a tincture, if kept secluded from the air, so as to prevent the loss of the alkohol by evaporation, can be preserved any length of time without decomposition.

Tinctures are prepared by infusing the materials in the spirit, without the application of heat. By applying heat, the solvent power is so far promoted, that the impregnation is effected in a shorter time; but the inactive and grosser matter, it has been supposed, is frequently liable to be extracted, and the high temperature is unnecessary, as, by allowing the solvent to remain a sufficient time (fourteen days usually) on the ingredients, it is fully saturated. Alkaline salts were at one time supposed to increase the solvent power, both of alkohol and diluted alkohol, the tincture being of a much deeper colour when a small portion had been added. But this arises, in part at least, from the action of the alkali on the colouring matter, as the same effect is obtained when they are added to a tincture already prepared; and even where they increase the solubility of some principles, as of resinous matter, they do not always coincide in medicinal operation with the substance operated on, and they render the tincture more nauseous.

Some tinctures are liable to decomposition on diluting them with water, those especially prepared with pure alkohol, in which resinous matter chiefly is dissolved, the resin being precipitated. Even tinctures prepared with

diluted alkohol are frequently rendered turbid by dilution with water. And it sometimes happens even that a decomposition ensues on mixing a tincture prepared with alkohol with another prepared with diluted alkohol. Such decompositions require to be attended to in their administration, and to be so far obviated, at least when the precipitation is copious, as that by trituration with mucilage the resinous matter shall be diffused.

TINCTURA ALOES SOCOTORINÆ. Tincture of Aloes. (Tinct. Aloes, *Ph. Lond. Dub.*)

"Take of Socotorine Aloes in powder, half an ounce; Extract of Liquorice, one ounce and a half; Alkohol, four ounces; Water, one pound. Digest for seven days with a gentle heat in a close vessel, shaking the vessel frequently, and pour off the tincture when clear."

This tincture, which has a place in all the Pharmacopœias, is the only one in which the solvent has a still larger proportion of water than the diluted alkohol of the usual strength. It dissolves, however, the aloes sufficiently. The liquorice is designed to cover the taste, which it does very imperfectly. The tincture may be employed as a cathartic in the dose of an ounce, but is seldom used; aloes, from its intense bitterness, being better prescribed under the form of pill.

TINCTURA ALOES ÆTHEREA. Ethereal Tincture of Aloes.

"Take of Socotorine Aloes, Myrrh, of each in powder, one ounce and a half; English Saffron, one ounce; Spirit of Sulphuric Ether, one pound. Digest the myrrh with the spirit for four days in a closed phial; then add the saffron and aloes. Digest again for four days; and when the impurities have subsided, pour off the tincture."

If the ingredients of this tincture were digested together, the spirit would be so much saturated with the aloes, as to take up little of the myrrh; but by digesting it first on the myrrh, it dissolves a larger quantity of it, and is still capable of dissolving a sufficient proportion of the

aloes and saffron. The spirit of sulphuric ether affords a more grateful tincture than alkohol. A similar preparation has long kept its place in the Pharmacopœias, under the name of Elixir Proprietatis, and has been much used as a stimulant aperient in dyspeptic affections, jaundice and amenorrhœa, given in a dose of one or two drachms. In the dose of six drachms it acts as a cathartic.

TINCTURA ALOES CUM MYRRHA. Tincture of Aloes and Myrrh. (Tinct. Aloes Comp. *Ph. Lond. et Dub.*)

"Take of Myrrh in powder, two ounces; Alkohol, one pound and a half; Water, half a pound. Mix the alkohol with the water; then add the myrrh; digest for four days; and lastly, add, of Socotorine Aloes, one ounce and a half; English Saffron, one ounce. Digest again for three days, and pour off the pure tincture."

This tincture differs in little from the former but in the menstruum. Being less grateful, it is used principally externally as an application to bleeding wounds, and a stimulant to foul ulcers.

TINCTURA AMOMI REPENTIS. Tincture of Cardamom. (Tinct. Cardam. *Ph. Lond. et Dub.*)

"Take of Cardamom Seeds, four ounces; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

This tincture is used for its aromatic flavour and pungency; and as these are not considerable, it is but little employed.

TINCTURA ARISTOLOCHIÆ SERPENTARIÆ. Tincture of Snake-Root. (Tinct. Serpent. *Ph. Lond. et Dub.*)

"Take of Virginian Snake-Root bruised, two ounces; Cochineal in powder, one drachm; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

Serpentaria is seldom exhibited under the form of tincture, and it would require indeed to be given in such a dose, that the power of the menstruum would be pre-

dominant. As a grateful bitter, it may be given occasionally in dyspepsia in a dose of two drachms.

TINCTURA BENZOIN COMPOSITA, *vulgo Balsamum Traumaticum.* Compound Tincture of Benzoin. (Tinct. Benzoini Comp. *Ph. Lond. Dub.*)

"Take of Benzoin in powder, three ounces; Balsam of Peru, two ounces; Hepatic Aloes, half an ounce; Alkohol, two pounds. Digest for seven days, and strain through paper." Balsam of Tolu and Storax are substituted in the other Pharmacopœias for the Peru Balsam.

This is used only externally, and principally as an application to recent superficial wounds. It has long been in use under the names of Wade's Balsam and Friar's Balsam. A piece of linen moistened with it generally stops the hæmorrhage from a slight wound, and allows it to heal by the first intention. It is also sometimes applied as a stimulant to foul ulcers.

TINCTURA CAMPHORÆ, *vulgo Spiritus Vinosus Camphoratus.* Tincture of Camphor. (Spirit. Camphor. *Ph. Lond. Dub.*)

"Take of Camphor, one ounce; Alkohol, one pound. Mix, so as to dissolve the camphor. It may be also made with a double or triple proportion of camphor." In the London and Dublin Pharmacopœias, it is prepared of the strength of two ounces to a pint of spirit.

This solution is used externally as a stimulant and anodyne application in chronic rheumatism and spasmodic pains, being rubbed on the part. It is applied in a similar manner to bruises and strains. Linen moistened with it is used as an application to chilblains; and it is sometimes added in small quantity to collyria employed in ophthalmia.

The London College have inserted another solution of camphor in alkohol, impregnated with ammonia, under the name of

LINIMENTUM CAMPHORÆ COMPOSITUM.

"Take of Camphor, two ounces; Water of Ammonia, six ounces; Spirit of Lavender, a pint. Mix the water of

ammonia with the spirit, and distil a pint from a glass retort with a gentle heat. Dissolve the camphor in the distilled liquor."

This liniment is applied to the same uses as the preceding, but the addition of the ammonia renders it more powerful as a stimulant.

TINCTURA CASTOREI. Tincture of Castor. (Tinct. Castor. *Ph. Lond. Dub.*)

"Take of Russian Castor, one ounce and a half; Alkohol, one pound. Digest for seven days, and strain through paper." In the Dublin Pharmacopœia, this tincture is ordered to be prepared with diluted alkohol; but with pure alkohol it is more grateful.

Castor is a substance nearly inert, and this tincture, in which a small quantity of it only is dissolved, can scarcely be supposed to have any medicinal efficacy. It is given sometimes as an antispasmodic, in a dose of from half a drachm to a drachm.

TINCTURA CASTOREI COMPOSITA. Compound Tincture of Castor.

"Take of Russian Castor, one ounce; Assafœtida, half an ounce; Ammoniated Alkohol, one pound. Digest for seven days, and strain through paper."

This tincture, which has a place only in the Edinburgh Pharmacopœia, is rather more active than the former, from the addition of the assafœtida and the ammonia. It is given in hysteria in the dose of a drachm.

TINCTURA CINCHONÆ OFFICINALIS. Tincture of Peruvian Bark. (Tinct. Cinchonæ, *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, four ounces; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper." In the formula of the London College, seven ounces of bark are ordered to two pints of proof spirit, whether with the effect of rendering the tincture much stronger may be considered as doubtful.

The active matter of bark is extracted by diluted alko-

hol, but so sparingly, that it may be doubted whether in the tincture the powers of the menstruum are not greater than those of the bark. It can therefore never be employed where large quantities of cinchona are required. It is used only as a bitter in dyspepsia, occasionally, in a dose of two drachms, and for this purpose the compound tincture of bark, to be afterwards noticed, is preferable.

TINCTURA CINNAMOMI COMPOSITA, *olim Tinctura Aromatica.* Compound Tincture of Cinnamon, formerly Aromatic Tincture. (Tinct. Cinnam. Comp. *Ph. Lond. Dub.*)

"Take of Cinnamon Bark bruised, Cardamom Seeds bruised, each one ounce; Long Pepper in powder, two drachms; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain."

This is a grateful aromatic tincture, seldom used by itself, but frequently added to other tinctures, or to mixtures, to communicate flavour and pungency. It is thus often used in combination with bitters and astringents.

TINCTURA COLOMBÆ. Tincture of Colombo. (Tinct. Colomb. *Ph. Lond. Dub.*)

"Take of the Root of Colombo in powder, two ounces; Diluted Alkohol, two pounds. Digest for seven days, and strain through paper."

Colombo does not appear to yield its active matter very readily, at least this tincture is not strong, and cannot be employed for any of the more important purposes for which this root is prescribed. It is used indeed merely as a bitter tincture in dyspepsia, in a dose of three or four drachms.

TINCTURA CONVOLVULI JALAPÆ. Tincture of Jalap. (Tinct. Jalap. *Ph. Lond. Dub.*)

"Take of the Root of Jalap in powder, three ounces; Diluted Alkohol, fifteen ounces. Digest for seven days, and strain through paper."

The activity of jalap resides in a resinous matter, which in this tincture is extracted along with a portion of mucilage. It may be given as a cathartic, in a dose of

four or six drachms. Jalap, however, is usually rather given in substance, and scarcely ever under this form.

TINCTURA CROCI. Tincture of Saffron. (Tinct. Croci, *Ph. Dub.*)

"Take of English Saffron, one ounce; Diluted Alkohol, fifteen ounces. Digest for seven days, and strain through paper."

This tincture is to be valued only for its colour.

TINCTURA DIGITALIS PURPUREÆ. Tincture of Foxglove. (Tinct. Digital. *Ph. Lond. Dub.*)

"Take of the dried Leaves of Foxglove, one ounce; Diluted Alkohol, eight ounces. Digest for seven days, and strain through paper." In the preparation of this very active and important tincture, the same proportions are ordered in all the Pharmacopœias.

Tincture of Foxglove has been supposed to be the form under which the operation of this plant as a narcotic is best obtained, and it is with this view that it has been introduced: it has also the important advantages, that it can be kept without the powers of the digitalis being impaired, and that its dose is easily regulated. The usual dose is ten drops, which, according to the general rules observed in the administration of digitalis, is to be continued until its effects are obtained.

TINCTURA FERULÆ ASSAFOETIDÆ. Tincture of Assafœtida. (Tinct. Assafœtid. *Ph. Lond. Dub.*)

"Take of Assafœtida, four ounces; Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

Alkohol being the solvent in this tincture, it is a solution chiefly of the resinous part of the assafœtida, and it is more grateful than when made with proof spirit. The Dublin College order a menstruum, composed of two pints of rectified spirit, and eight ounces of water. As a remedy in tympanitis and hysteria, it is sometimes given in a dose of one drachm; but in any quantity in which it can be given, so that the operation of the solvent shall not be predominant, its effects must be extremely trivial.

Tinctura gentianæ composita, *vulgo Elixir Stomachicum.* Compound Tincture of Gentian. (Tinct. Gentian. Comp. *Ph. Lond. Dub.*)

"Take of Gentian Root, two ounces; dried Orange Peel, one ounce; Canella Bark, half an ounce; Cochineal, half a drachm; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

In this tincture, the bitterness of the gentian is completely extracted, and it is rendered more grateful by the aromatic quality of the orange peel and canella. It is used as a stomachic in a dose of two or three drachms, in cases where the stomach is disordered from any occasional cause. In more permanent forms of dyspepsia, it cannot be employed with equal advantage, and the continued use of tinctures of this kind ought always, as Cullen remarked, to be avoided, as being liable to accustom the stomach to the stimulus of ardent spirit.

Tinctura guajaci. Tincture of Guaiac. (Tinct. Guaiac, *Ph. Lond. Dub.*)

"Take of the Resin of Guaiac, one pound; Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

The proportion of guaiac to the solvent in this tincture, is unnecessarily large. Only half a pound in the London Pharmacopœia, and four ounces in the Dublin Pharmacopœia, are ordered to two pints of alkohol.

This tincture may be given in a dose of two or three drachms, but it is inferior in activity to the one which follows.

Tinctura guajaci ammoniata. Ammoniated Tincture of Guaiac. (Tinct. Guaiac. Amm. *Ph. Lond. Dub.*)

"Take of the Resin of Guaiac, four ounces; Ammoniated Alkohol, one pound and a half. Digest for seven days, and strain through paper."

As the ammonia coincides with the guaiac as a stimulant and diaphoretic, this affords a preparation of more efficacy, it is supposed, than the simple tincture, and it

is more frequently employed. It is given in chronic rheumatism, in a dose from one to two drachms.

TINCTURA HELLEBORI NIGRI. Tincture of Black Hellebore. (Tinct. Helleb. Nig. *Ph. Lond. Dub.*)

"Take of black Hellebore Root bruised, four ounces; Cochineal, half a drachm; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

It was under the form of this tincture that black hellebore was celebrated by Mead as an emmenagogue, in a dose of one drachm. Cullen remarks with regard to it, that he had never found it successful, and it is now little used.

TINCTURA HYOSCYAMI NIGRI. Tincture of Black Henbane. (Tinct. Hyoscyam. *Ph. Lond. Dub.*)

"Take of the Dried Leaves of Black Henbane, one ounce; Diluted Alkohol, eight ounces. Digest for seven days, and strain through paper."

Henbane has been introduced in modern practice as a substitute for opium in particular cases, already pointed out under its history. The inspissated juice being liable to be variable in strength, the tincture has been employed, and has now a place in all the Pharmacopœias, nearly of the same strength. Its dose has been stated to be twenty-five drops, but in general not much effect is obtained from it under a dose of half a drachm.

TINCTURA KINO. Tincture of Kino. (Tinct. Kino, *Ph. Lond. Dub.*)

"Take of Kino, two ounces; Diluted Alkohol, one pound and a half."

Kino consists principally of tannin: it is entirely soluble in diluted alkohol. The dose of this tincture is from half a drachm to a drachm.

Tinctura lauri cinnamomi. Tincture of Cinnamon. (Tinct. Cinnamom. *Ph. Lond. Dub.*)

"Take of Cinnamon Bark bruised, three ounces; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

The diluted alkohol is impregnated with the aromatic flavour of the cinnamon, and it is merely as possessing this flavour that this tincture is used in mixtures.

Tinctura meloes vesicatorii, *vulgo Tinctura Cantharidum.* Tincture of Cantharides. (Tinct. Cantharid. *Ph. Dub.*—Tinct. Lyttæ, *Ph. Lond.*)

"Take of Cantharides bruised, one drachm; Diluted Alkohol, one pound. Digest for seven days, and strain through paper."

Diluted alkohol extracts and holds dissolved the acrid matter of cantharides, and it is under this form that this substance has been generally employed internally, being more manageable in its dose than it is in powder. It has been given as a diuretic in dropsy, and as a remedy in incontinence of urine, gleet, leucorrhœa, and some cutaneous diseases. Its dose is from ten to twenty drops, increased gradually until some sensible operation is produced. Dr. C. Smyth has remarked, however, that in ischuria arising from debility of the coats of the bladder, he had found little advantage derived from the tincture, while in substance the cantharides had been successful. The tincture is also employed externally as a rubefacient.

Tinctura mimosæ catechu, *olim Tinctura Japonica.* Tincture of Catechu. (Tinct. Catechu, *Ph. Lond. Dub.*)

"Take of Catechu, three ounces; Bark of Cinnamon, two ounces; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

Catechu, consisting almost entirely of tannin and extractive matter, is dissolved by diluted alkohol, and in this tincture it is rendered more grateful by the cinnamon. It is given in a dose of one drachm, as an astringent.

TINCTURA MYRRHÆ. Tincture of Myrrh. (Tinct. Myrrhæ, *Ph. Lond. Dub.*)

"Take of Myrrh in powder, three ounces; Alkohol, twenty ounces; Water, ten ounces. Digest for ten days, and strain through paper."

Myrrh being principally resinous, is not entirely soluble in common proof spirit, and therefore alkohol less diluted is employed for its solution. The tincture is used principally as an external stimulant and antiseptic application, more especially in affections of the teeth and gums.

TINCTURA OPII, *sive Thebaica; vulgo, Laudanum liquidum.* Tincture of Opium. (Tinct. Opii, *Ph. Lond. Dub.*)

"Take of Opium, two ounces; Diluted Alkohol, two pounds. Digest for seven days, and strain through paper."

In this tincture all the active matter of opium is dissolved, the residuum being impurities or insoluble matter, and a given quantity of the tincture having been found to produce the same effects on the system nearly as the quantity of opium, which, by calculation, it contained, ought to have done, allowance being made for the undissolved matter. The proportion of opium to each drachm of the tincture is five grains, but by evaporation it is found to yield only three grains and a half; twenty-five drops is supposed to be equal in power to one grain of solid opium, and is the dose commonly given to a person not accustomed to it. It is of the same strength as ordered in the different Pharmacopœias.

Laudanum, as this tincture is named, is given in all the cases in which opium is usually administered, and is preferred to it as being more speedy in its operation, more manageable in its dose, and more convenient for combination with other remedies. Where the stomach is in an irritable state, so as to be easily excited to vomiting, or where the operation of the opium is wished to be exerted more slowly, or more peculiarly on the intestinal canal as in diarrhœa and spasmodic colic, it is given in

the solid state, and usually in the form of pill. Externally the tincture is occasionally applied locally as a stimulant and anodyne.

TINCTURA OPII AMMONIATA; *olim*, *Elixir Paregoricum*. Ammoniated Tincture of Opium.

"Take of Benzoic Acid, English Saffron, of each three drachms; Opium, two drachms; Volatile Oil of Anise, half a drachm; Ammoniated Alkohol, sixteen ounces. Digest for seven days in a shut phial, and strain through paper."

This formula is designed as the improvement of a preparation which has long been medicinally employed under the name of Paregoric Elixir, and which, as a weak and pleasant opiate, has in particular been much used as a remedy in catarrh. The formula, however, is but ill contrived. While the ammonia can add nothing to the efficacy of the preparation, its pungency renders it extremely ungrateful; and the tincture approaches too nearly in strength to the common tincture of opium. The Paregoric Elixir of the London Pharmacopœia, and which has now also a place in the Dublin Pharmacopœia, (Tinct. Opii Camphorata, to be afterwards noticed), is better adapted to the purposes for which it is designed, and is generally preferred. The composition of the Edinburgh College contains a grain of opium in a drachm, and this is its medium dose. The other does not contain more than a grain in half an ounce.

The operation of the opium cannot be much influenced by the substances with which it is combined in this formula. The common application of it is as a remedy in catarrhal affections. Its dose is from half a drachm to a drachm, sometimes two drachms, taken generally at bedtime.

TINCTURA RHEI PALMATI. Tincture of Rhubarb. (Tinct. Rhei, *Ph. Lond. Dub.*)

"Take of the Root of Rhubarb, three ounces; Lesser Cardamom Seeds, half an ounce; Diluted Alkohol, two

pounds and a half. Digest for seven days, and strain through paper."

Proof spirit extracts nearly all the active matter of rhubarb, and this tincture therefore has all its powers. It is sometimes prescribed in dyspeptic affections and in diarrhœa, in a dose from half an ounce to an ounce. The tincture of the Dublin Pharmacopœia has the addition of a little liquorice and saffron.

TINCTURA RHEI ET ALOES; *olim*, *Elixir Sacrum*. Tincture of Rhubarb with Aloes.

"Take of the Root of Rhubarb cut, ten drachms; Socotorine Aloes, six drachms in powder; Lesser Cardamom Seeds bruised, half an ounce; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

"The cathartic power of the rhubarb is in this tincture increased by combination with the aloes. It is employed as a stimulating aperient and purgative, in a dose from half an ounce to an ounce, frequently also as an emmenagogue.

TINCTURA RHEI ET GENTIANÆ; *olim*, *Tinctura Rhei Amara*. Tincture of Rhubarb with Gentian.

"Take of Root of Rhubarb, two ounces; Gentian Root, half an ounce; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

This combination of gentian with rhubarb is supposed to render it a more useful remedy in dyspeptic cases; but the power of the one is so inconsiderable, compared with that of the other, that no important advantage is gained from it. Its dose is from two to four drachms.

TINCTURA SAPONIS, *vulgo Linimentum Saponaceum*. Tincture of Soap. (Liniment. Sapon. *Ph. Lond. Dub.*)

"Take of Soap, four ounces; Camphor, two ounces; Volatile Oil of Rosemary, half an ounce; Alkohol, two pounds. Digest the soap in the alkohol for three days; then add the camphor and oil to the strained liquor, agitating it." There is a similar composition in the London

and Dublin Pharmacopœias, under the name of LINIMENTUM SAPONIS COMPOSITUM, three ounces of hard soap and one ounce of camphor being dissolved in a pint of spirit of rosemary.

This is a stimulant of considerable efficacy, used as an external application, by friction, in strains and rheumatic pains.

TINCTURA SAPONIS CUM OPIO; *olim*, *Linimentum Anodynum*. Tincture of Soap with Opium.

"This is made in the same manner, and from the same ingredients, as the tincture of soap; only adding at first one ounce of opium."

It is used for the same purposes as the preceding tincture, and likewise as an anodyne in rheumatism and spasms of the muscles. It is frequently successful in relieving pain by topical application, though the relief is often only temporary.

TINCTURA SENNÆ COMPOSITA, *olim Elixir Salutis*. Tincture of Senna. (Tinct. Sennæ, *Ph. Lond. Dub.*)

"Take of the Leaves of Senna, two ounces; Root of Jalap, one ounce; Coriander Seeds, half an ounce; Diluted Alkohol, three pounds and a half. Digest for seven days, and to the tincture strained through paper add four ounces of Refined Sugar."

This forms a very excellent purgative tincture, less unpleasant in its taste than any of the other cathartic tinctures, not liable therefore to excite nausea, and at the same time operating sufficiently well. Its dose is one ounce or ten drachms. In the London and Dublin Pharmacopœias it is prepared without the jalap, and is therefore less active.

TINCTURA TOLUIFERÆ BALSAMI; *olim*, *Tinctura Tolutana*. Tincture of Tolu Balsam. (Tinct. Bals. Tolut. *Ph. Dub.*)

"Take of Balsam of Tolu, one ounce and a half; Alkohol, one pound. Digest until the balsam is dissolved, and strain through paper."

The tolu balsam is entirely soluble in alkohol; but as

it is a substance of no activity, this tincture is scarcely used but on account of its flavour, and for making the syrup of tolu.

Tinctura veratri albi. Tincture of White Hellebore.

"Take of White Hellebore Root, eight ounces; Diluted Alkohol, two pounds and a half. Digest for seven days, and strain through paper."

White hellebore is a medicine perhaps never prescribed internally, its operation is so violent. The dose of this tincture cannot exceed a few drops. Neither is it used as an external application.

The following are the Tinctures peculiar to the London and Dublin Pharmacopœias.

Tinctura aurantii. Tincture of Orange Peel. *Ph. Lond. Dub.*

"Take of Fresh Orange Peel, three ounces; Proof Spirit, two pints. Digest for three days, and strain."

The alkohol is in this tincture impregnated with the flavour and bitterness of the orange peel, and it may be used as communicating flavour, or in combination with more powerful bitters.

Tinctura camphoræ composita. Ph. Lond.

"Take of Camphor, two scruples; Hard Opium in powder, Acid of Benzoin, of each one drachm; Proof Spirit, two pints. Macerate for fourteen days, and strain." The same composition, with the addition of a drachm of Essential Oil of Anise, (which used also to be an ingredient in the above formula, but has been left out, as its flavour is rather disagreeable,) has a place in the Dublin Pharmacopœia, under the name of Tinctura Opii Camphorata.

This is the tincture which has been known under the name of Paregoric Elixir, and is in common use as a pleasant opiate in catarrh, two tea-spoonfuls being taken

at bed-time. Half an ounce of it contains a grain of opium. It is therefore inferior in strength, but less harsh and stimulating, as has been already remarked, than the tincture which has a place in the Edinburgh Pharmacopœia, under the same popular name of Paregoric Elixir. The London College have given it its present name, rather than the former one, of Tinctura Opii Camphorata, to lessen the risk of its being confounded with Tincture of Opium, in prescribing it.

Tinctura capsici. Tincture of Capsicum. Ph. Lond.

"Take of Capsicum Berries, an ounce; Proof Spirit, two pints. Macerate for fourteen days, and strain."

Under this form capsicum may be employed as a stimulant and stomachic; and diluted, it may afford an easy mode of forming the capsicum gargle.

Tinctura cardamomi composita. Compound Tincture of Cardamom. *Ph. Lond. Dub.*

"Take of Cardamom Seeds, Carraway Seeds, Cochineal, of each beat to powder, two drachms; Cinnamon Bark bruised, half an ounce; Raisins freed from the Stones, four ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

There is a similar composition under the same name in the Dublin Pharmacopœia, the raisins being omitted. With this omission, it is nearly the same with the Compound Tincture of Cinnamon of the Edinburgh Pharmacopœia, and may be applied to the same uses.

Tinctura cascarillæ. Tincture of Cascarilla. *Ph. Lond. Dub.*

"Take of Cascarilla Bark, four ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

Cascarilla is so little employed in modern practice, that there is scarcely any advantage in having its tincture as an officinal preparation.

Tinctura cinchonæ composita. Compound Tincture of Peruvian Bark. *Ph. Lond. Dub.*

"Take of Pale Peruvian Bark beat to powder, two ounces; Dried Orange Peel, an ounce and a half; Vir-

ginian Snake-Root bruised, three drachms; Saffron, one drachm; Cochineal, two scruples; Proof Spirit, twenty fluid ounces. Macerate for fourteen days, and strain."

This is the composition which has been known under the name of Huxham's Tincture of Bark. It is more grateful than the simple tincture, and, from the substances added to the cinchona, is probably a better stomachic. It is principally in dyspeptic affections that it is employed, in a dose of two drachms taken occasionally.

TINCTURA HUMULI. Tincture of Hop.

"Take of Hops, five ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

Hop having been introduced as a narcotic, the tincture affords a convenient form for its administration. It has been supposed to be nearly of the same strength as tincture of opium, but it requires in general to be given in a dose of from half a drachm to a drachm, to produce much sensible effect.

TINCTURA RHEI COMPOSITA. Compound Tincture of Rhubarb. Pharm. Lond.

"Take of Root of Rhubarb cut, two ounces; Liquorice Root bruised, half an ounce; Ginger Root cut, Saffron, of each two drachms; Water, a pint; Proof Spirit, twelve fluid ounces. Macerate for fourteen days, and strain."

The principle in which the purgative quality of rhubarb resides, has been supposed to be more completely dissolved by water than by other solvents; hence from the large proportion of water in this tincture, it is supposed this quality will be obtained more completely; while the proportion of alkohol will prevent spontaneous decomposition. Its medium dose as a purgative is an ounce.

TINCTURA SCILLÆ. Tincture of Squill. *Ph. Lond. Dub.*

"Take of Squill Root, recently dried, four ounces; Proof Spirit, two pints. Digest for fourteen days, and strain."

Squill, when employed as a diuretic, operates most effectually in substance: as an emetic or expectorant it is given under the form of the vinegar or syrup, the vinegar correcting its nauseous taste. It is not apparent what particular advantage is to be derived from a tincture of it,—a preparation in which the acrimony of the squill must be very imperfectly covered. The dose of this tincture is from twenty to sixty drops.

TINCTURA VALERIANÆ. Tincture of Valerian. *Ph. Lond. Dub.*

"Take of Valerian Root, four ounces; Proof Spirit, two pints. Digest with a gentle heat for fourteen days, and strain."

The active matter of valerian is sufficiently extracted by diluted alkohol. The powers of the menstruum probably however exceed those of the dissolved matter, and hence this tincture cannot be employed with much advantage.

TINCTURA VALERIANÆ AMMONIATA. Ammoniated Tincture of Valerian. *Ph. Lond. Dub.*

"Take of Valerian Root, four ounces; Aromatic Spirit of Ammonia, two pints. Digest for fourteen days, and strain."

This tincture may be more powerful than the preceding, from the impregnation of ammonia. It is employed in hysterical affections. Its dose is from one to two drachms.

TINCTURA ZINGIBERIS. Tincture of Ginger. *Ph. Lond. Dub.*

"Take of Ginger, two ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

This tincture contains the pungency of the ginger, and may be used as an aromatic to conceal the flavour and taste, or promote the operation of other remedies. To obviate flatulence, ginger is generally taken in substance.

TINCTURA ANGUSTURÆ. Tincture of Angustura. Ph. Dub.

"Take of the Bark of Angustura in coarse powder, two ounces; Proof Spirit, two pints. Digest for seven days, then strain the tincture."

Diluted alkohol dissolves the active matter of angustura; and under this form it has been sometimes given in dyspepsia, in a dose of two drachms occasionally.

TINCTURA GALBANI. Tincture of Galbanum. Ph. Dub.

"Take of Galbanum in small pieces, two ounces; Proof Spirit, two pints. Digest them for seven days; then strain the tincture."

This tincture has sometimes been used in hysteria, to to obviate flatulence, in a dose of two or three drachms. It can scarcely be supposed to have any power.

TINCTURA MOSCHI. Tincture of Musk. Ph. Dub.

"Take of Musk, two drachms; Rectified Spirit, one pint. Digest for seven days, and strain the tincture."

This tincture can be employed only to communicate the odour of musk, and is therefore of little importance.

TINCTURA QUASSIÆ. Tincture of Quassia. Ph. Dub.

"Take of the Wood of Quassia rasped, one ounce; Proof Spirit, two pints. Digest for seven days; then strain the tincture."

The bitterness of quassia may be sufficiently extracted in this preparation. These bitter tinctures appear, however, to be unnecessarily multiplied in the Pharmacopœias, especially as from the action of the menstruum on the stomach, the form of tincture is not the best for the administration of this class of remedies.

CHAPTER XIV.

EXTRACTA.—EXTRACTS.

EXTRACTS are preparations obtained by digesting or boiling vegetable substances in water, alkohol, or proof spirit. The menstruum dissolves the active matter of the vegetable; the tincture or decoction is strained, and is

evaporated until a mass of a stiff consistence is obtained. This is named an Extract, and either a watery or spiritous extract, as water or alkohol has been employed as the menstruum. If water has been used, the mucilage, extract, tannin, saccharine, and saline parts of the vegetable remain in the extract; if alkohol, the resin is its principal component part; and if proof spirit, all the fixed principles, which water and alkohol are separately capable of dissolving, are obtained.

It is evident, therefore, that the same mode of preparing these extracts is not applicable to every vegetable substance. Where the virtues depend principally on the extract or tannin which the substance contains, the watery extract will be proper: while, if it depend on a resinous part, the spiritous extract only will possess its virtues.

It is to be observed, however, that in the preparation of these extracts, the virtues of the substances are almost always injured to a certain extent. The essential oil, on which their flavour and aromatic quality depend, are dissipated; and in the preparation of the watery extracts, there is generally a partial decomposition of the active matter, by the necessary decoction. This preparation, therefore, is not now very frequently employed; and with the exception of some of the pure bitters, as gentian, or some of the saccharine vegetables, as liquorice, there is no medicine perhaps but what may be given with more advantage under some other form.

The Edinburgh and Dublin Colleges preserve the distinction of watery and spiritous extracts: the London College do not observe it; and they have farther associated, with what are more strictly named Extracts, the inspissated juices of vegetables, the consistence of these being similar; and the only circumstance in which they differ, that in the one the matter naturally dissolved in the juice of the plant, in the other, the matter extracted by the operation of a solvent is obtained, is not, it has been conceived, sufficiently important to constitute a distinction between them. I have adhered, however, to the arrangement of the Edinburgh Pharmacopœia, and under the

chapter of Inspissated Juices have already introduced those which are peculiar to the London Pharmacopœia.

I.—*Extracta per Aquam.—Extracts by Water.*

The directions for preparing these are given in the Edinburgh Pharmacopœia, under the Extract of Gentian. The directions in the other Pharmacopœias are essentially the same, a common water-bath being ordered for the inspissation; the extract being stirred constantly as it becomes thick, and when prepared being kept with a little alkohol sprinkled on the surface.

Extractum gentianæ luteæ. Extract of Gentian. (Extr. Gent. *Ph. Lond. Dub.*)

"Take of Gentian Root, any quantity. Having cut and bruised it, add eight times its weight of Distilled Water. Boil to one half, and strain, expressing the liquor strongly. Reduce it immediately to the consistence of thick honey, by evaporation in a bath, of boiling water saturated with muriate of soda."

This extract is intensely bitter, the quality of bitterness appearing in general not to be injured by the operation of decoction or evaporation. It is generally used to form other medicines into pills, particularly those with which it coincides in medicinal virtues, as tonics and emmenagogues.

In the same manner are prepared the following Extracts:

Extractum florum anthemidis nobilis. Extract of Chamomile. (Extr. Anthem. *Ph. Lond.*—Extr. Chamom. *Ph. Dub.*)

The bitterness of chamomile is rendered rather ungrateful in its infusion, by the flavour of its essential oil. This is entirely dissipated by decoction, and the extract is, therefore, a pure and grateful bitter. It is scarcely applied, however, to any use.

Extractum foliorum cassiæ sennæ. Extract of Senna.

Senna has its activity much impaired by decoction. The extract, therefore, besides that it has no particular advantage, cannot be regarded as a proper preparation of it, and it is accordingly found not to be more powerful than the leaf in substance.

Extractum radicis glycyrrhizæ glabræ. Extract of Liquorice Root. (Extr. Glycyrrh. *Ph. Lond. Dub.*)

The active matter of this root consists chiefly of mucilage and saccharine matter, and suffers therefore little injury in this preparation. The extract is seldom prepared in the shops but on a large scale; and this extract of commerce is usually in an impure state. In some of the foreign Pharmacopœias, it is purified by solution in water, straining, and a new evaporation; and an extract either prepared in this way, or directly from the root itself, due care being taken in its preparation so as to have it pure, is now sold under the name of Refined Liquorice. It is evaporated so as to be perfectly hard, and is in common use as a demulcent in catarrh, being allowed to dissolve slowly in the mouth.

Extractum ligni hæmatoxyli campechensis. Extract of Logwood. (Extr. Hæmatoxyl. *Ph. Lond. Dub.*)

The astringency of the logwood is obtained with no sensible injury in this extract. It has been proposed to be employed as an astringent, in a dose from ten to twenty grains, but has never been established in use.

Extractum radicis hellebori nigri. Extract of Black Hellebore Root. (Extr. Helleb. N. *Ph. Dub.*)

The aqueous extract of this root is comparatively mild in its operation, and is even said to be milder than the root itself. In a dose from ten to twenty grains, it operates as a cathartic, and has been employed as such in mania, and in a smaller dose, as an emmenagogue, but its uniformity of operation cannot be depended on. The spiritous extract, which has a place in some of the

foreign Pharmacopœias, is a more active medicine. It has been used as a hydragogue cathartic, and is the basis of Baccher's tonic pills, once highly celebrated in the treatment of dropsy.

EXTRACTUM CAPITUM PAPAVERIS SOMNIFERI. Extract of Poppy. (Extract. Papav. *Ph. Lond.*)

This extract from the capsule of the poppy retains its nareotic quality to a certain extent. It is, however, so far injured, that the extract is not uniform in strength, and is therefore little used. Sometimes it is employed in making the syrup of poppy, a drachm of it being dissolved in a pound of water, and boiled with a pound of sugar.

EXTRACTUM FOLIORUM RUTÆ GRAVEOLENTIS. Extract of Rue. (Extr. Rutæ, *Ph. Dub.*)

As the virtues of Rue reside chiefly, if not entirely, in its essential oil, this extract must be regarded as an injudicious preparation. It is intended for administration in amenorrhœa, its dose being from ten to fifteen grains; but it has probably no power.

THE following watery extracts have a place in the Dublin or London Pharmacopœia.

EXTRACTUM ALOES. Extract of Aloes. Ph. Lond.

"Take of Socotorine Aloes in powder, half a pound; Boiling Water, four pints. Macerate for three days with a gentle heat; then strain, and put the liquor aside, that the impurities may subside. Pour off the purified liquor, and evaporate, until it attain a proper consistence."

The object of this preparation is not so much to separate the aloes from any impurities, for the socotorine aloes scarcely contains any, but to obtain a gummy extract with less resin, which is said to be equally purgative, less stimulating and less ungrateful. Its dose is ten or fifteen grains.

EXTRACTUM CINCHONÆ, *vulgo Corticis Peruviani.* Extract of Peruvian Bark. *Ph. Lond. Dub.*

" Take of Pale Peruvian Bark, in coarse powder, one pound; Water, one gallon. Boil to six pints, and strain the liquor while hot. In the same manner boil it four times, in the same quantity of water, and strain the liquors. Then reduce all these liquors, mixed together, to a proper consistence, by evaporation.

" This extract ought to be kept *soft*, fit to form pills; and *hard*, so that it may be reduced to powder."

The active matter of bark is in a great measure of an extractive and resinous nature, being more soluble in alkohol than in water; but the water, when assisted by a boiling heat, is capable of dissolving it; and as a great part of the bark in substance consists of inert ligneous matter, it might be supposed that some advantage is derived from this preparation. During the boiling and evaporation, however, it suffers a chemical change to a certain extent; for the decoction itself becomes turbid, during boiling, from the dissolved matter becoming less soluble, a change probably analogous to that which takes place in several varieties of vegetable matter, exposed in a humid state, and at an elevated temperature, and the nature of which, so far as it has been determined, has been already explained (page 38). Hence the extract obtained is far from being equal in efficacy to the quantity of bark from which it is prepared. Its medium dose is ten grains, which is supposed to be equivalent to half a drachm of the bark in substance, but from the uncertainty of its strength it is little employed.

EXTRACTUM COLOCYNTHIDIS. Extract of Colocynth. Ph. Lond.

" Take of the Pulp of Colocynth, one pound; Water a gallon. Boil to four pounds, and strain the liquor while hot; then reduce it by evaporation to the proper consistence."

The active matter of colocynth is so far extracted by water by decoction, that the extract has a cathartic quality. It is less powerful, however, and has been supposed

to be less irritating than the pulp itself. Its dose is from six to ten grains.

Extractum colocynthidis compositum. Compound Extract of Colocynth. *Ph. Lond. Dub.*

"Take of the Pulp of Colocynth cut, six drachms; Socotorine Aloes in powder, an ounce and a half; Scammony in powder, half an ounce; Cardamom Seeds in powder, a drachm; Hard Soap, three drachms; Boiling Water, two pints. Macerate the pulp of colocynth in the water, with a gentle heat, for four days. Strain the liquor, and add to it the aloes, scammony and soap; then evaporate until it attain a proper consistence, and towards the end of the evaporation, mix in the cardamom seeds."

This is the officinal preparation which has long had a place in the Pharmacopœias, under the name of Extractum Catharticum. It is a combination of the more powerful cathartics; and as these operate more effectually, and with less irritation when combined, than when one alone in a large dose is employed, the composition is well adapted for administration in cases where it is difficult to excite purging. It used formerly to be prepared by employing diluted alkohol as the solvent, not only of the colocynth, but also of the resinous substances, and evaporating the solution; the present method is more economical, and will probably afford a product more uniform in strength. The extract is usually given in doses of from five to ten, or fifteen grains, repeated at short intervals until it produce purging. Its power may also be safely promoted, by adding a portion of calomel.

Extractum humuli. Extract of Hop. Ph. Lond.

"Take of Hops, half a pound; Water, a gallon. Boil to four pints, and strain the liquor while it is hot; then reduce it by evaporation to the proper consistence."

Hop has been introduced into practice as a narcotic, possessing also from its bitterness a degree of tonic

power. The bitterness will be obtained in this extract, but it is probable that the narcotic power is impaired, and that in this property it will not be uniform in strength. The dose of this extract is from five to fifteen grains.

EXTRACTUM OPII. Extract of Opium. Ph. Lond. (Extractum Opii Aquosum, *Ph. Dub.*)

"Take of Opium cut into pieces, half a pound; Water, three pints. Add to the opium a small quantity of the water, and macerate for twelve hours that it may become soft; then add gradually the remaining water, triturate until they are intimately mixed, and put aside the mixture that the impurities may subside: then strain the liquor, and evaporate it to the proper consistence."

Any process of this kind, designed to purify opium, is altogether superfluous, for the impurities of the opium of commerce are inconsiderable, and neither alter its powers, nor add materially to its bulk. And if such processes are designed to correct any of the qualities of the opium, whence the unpleasant symptoms which sometimes follow from its administration are supposed to arise, they probably rest on inacurate views of its operation. The active matter of opium is not entirely extracted by water. In the present process, therefore, the product must differ from the crude opium, and it would require clinical experience more extensive and accurate than we yet have, to ascertain correctly its real powers. It must, besides, be altered, and rendered at the same time uncertain in strength by the chemical change which it will suffer during its inspissation. Even when the active principles of the opium have been extracted by diluted alkohol, though the solvent is more powerful, requires less heat for its evaporation, and counteracts to a certain extent the action of the air, still the inspissated mass is found to be inferior in strength to opium in its unpurified state, and this must be still more the case in the present process, where water only is employed. It may therefore be questioned whether any

preparation of this kind retains its place with propriety in the Pharmacopœias.

Extractum rhei. Extract of Rhubarb. Ph. Lond.

"Take of the Root of Rhubarb bruised, one pound; Diluted Alkohol, a pint; Water, seven pints. Macerate for four days with a gentle heat, and put aside the liquor, that the impurities may subside: pour it off when clear, and reduce it by evaporation to the proper consistence."

The purgative power of rhubarb is usually considered as being more peculiarly extracted by water, and may therefore be obtained in this extract. It will equally be obtained, however, in the simple infusion, which, as being an extemporaneous preparation, is preferable to this one, that besides the change that may be produced in it by inspissation, must be farther liable to decomposition when kept in a soft state.

Extractum sarsaparillæ. Extract of Sarsaparilla. Ph. Lond.

"Take of Sarsaparilla Root cut, a pound; Boiling Water, a gallon. Macerate for twenty-four hours; then boil to four pints, and strain the liquor while hot; lastly, reduce it by evaporation to the proper consistence."

Sarsaparilla being usually given under the form of watery decoction, there appears to be no particular advantage in preparing from this an extract, as the decoction may be brought to any state of concentration, by using an increased proportion of the root, or continuing the boiling for a longer time. And a watery extract, mucilaginous as this is, besides the injury it will probably suffer in its inspissation, will farther be liable to spontaneous decomposition on keeping, and is therefore unfit for an officinal preparation.

Extractum taraxaci. Extract of Dandelion. *Ph. Lond. Dub.*

"Take of the Fresh Root of Dandelion bruised, a pound; Boiling Water, a gallon. Macerate for twenty-four hours; then boil to eight pints, and strain the liquor while hot; lastly, evaporate it to the proper consistence."

The recent root of dandelion has been ranked as an aperient and diuretic. The expressed juice, or decoction of the root, has been employed as a remedy in dropsy, biliary obstructions and induration of the liver, and, according to Bergius, has proved frequently successful where other remedies had failed. Whatever may be the powers of the plant, it may be doubted if the form of the watery extract be the best for its administration.

EXTRACTUM VALERIANÆ. Extract of Valerian. Ph. Dub.

"Take of Valerian Root in coarse powder, six ounces; Boiling Water, three pints. Digest for twenty-four hours in a close vessel with a moderate heat; press out the liquor, and reduce it to a proper consistence by evaporation."

The medicinal powers of valerian appear to be connected with the principle in which its odour resides; and as this must be in a great measure dissipated by evaporation, it may be doubted if this is a form of preparation properly adapted. It can at least have no advantage over the extemporaneous infusion or decoction.

EXTRACTUM CACUMINUM ABSINTHII. Extract of the Tops of Wormwood. Ph. Dub.

This extract prepared in the usual manner from the flowering tops of the wormwood, is intensely bitter; and the unpleasant odour of the plant is dissipated during the evaporation. It may be substituted medicinally for extract of gentian. It is sometimes used, instead of hops, to give bitterness to fermented liquors.

EXTRACTUM CACUMINUM GENISTÆ. Extract of Broom Tops. Ph. Dub.

The infusion of the tops of the broom has a degree of diuretic power, whence it has been employed as a remedy in dropsy. The extract can scarcely be supposed to have much power, and it is now expunged from the Edinburgh Pharmacopœia, where it formerly had a place.

Extractum radicis jalapæ. Extract of Jalap Root. Ph. Dub.

The active matter of jalap is partly resinous, and must therefore be imperfectly extracted by water. The extract thus prepared may be milder than the root, but must be liable to be uncertain in strength. A resinous extract is prepared by the action of diluted alkohol, which has a place in all the Pharmacopœias, and which will be a more active preparation, though neither of them probably is of much utility.

Extractum corticis quercus. Extract of Oak Bark. Ph. Dub.

In this extract the astringency of the oak bark will be obtained probably with little injury, and, consisting principally of tannin, it will not be very liable to spontaneous decomposition. It can have scarcely any advantage, however, but what may be equally obtained from the decoction.

Extractum foliorum sabinæ. Extract of Leaves of Savin. Ph. Dub.

The medicinal powers of this herb seem in a great measure to depend on its essential oil, and as this must be dissipated during the evaporation, the extract must be comparatively an inactive preparation. It is never used.

II.—*Extracta per Aquam et Alkohol.—Extracts by Water and Alkohol.*

The directions for preparing these are given under the first of them, the Extract of Bark.

Extractum cinchonæ officinalis. Extract of Peruvian Bark. (Extr. Cinch. Resin. *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, one pound; Alkohol, four pounds. Digest for four days, and pour off the tincture. Boil the residuum in five pounds of distilled water for a quarter of an hour, and strain the

decoction while hot through linen. Repeat this boiling and straining with an equal quantity of distilled water, and reduce the liquor by evaporation to the consistence of thin honey. Draw off the alkohol from the tincture by distillation, until it is reduced to a similar consistence. Then mix the liquors thus inspissated, and reduce to a proper consistence by a bath of boiling water, saturated with muriate of soda."

This preparation will probably be more active than the watery extract of bark. By the joint action of the alkohol and water, all the principles of the bark are extracted, and nothing remains but the inert ligneous fibre. And in the subsequent evaporation, the dissolved matter suffers less injury, partly from less heat being required to bring it to the due consistence, and partly perhaps from the alkohol resisting the oxygenation of the extract. It is, however, much more expensive; and the extract of bark to be found in the shops is almost always that which is prepared by the other formula. The dose of the spiritous extract is ten grains, and it affords a very convenient vehicle for combining bark with the more active preparations of iron in the form of pill.

EXTRACTUM RADICIS CONVOLVULI JALAPÆ. Extract of Jalap. (Extr. Jalap. Resin. *Ph. Dub. Lond.*)

This is ordered to be prepared in the same manner as the Extract of Bark. From the solvent employed, both the resinous and mucilaginous parts of the jalap root are extracted, and it is therefore a more active preparation than the watery extract of jalap already noticed. It exerts its cathartic operation fully in a dose of ten or twelve grains, but it has no particular advantage.

BESIDES these two, which have a place both in the Dublin and the London Pharmacopœias, there are other two spiritous extracts admitted by the Dublin College.

EXTRACTUM CASCARILLÆ RESINOSUM. Resinous Extract of Cascarilla. Ph. Dub.

This is prepared from the cascarilla bark, in the same manner as the resinous extract of cinchona is prepared. It may contain the active matter of the cascarilla, and may be given as a bitter and tonic, in the dose of a scruple; but there does not appear to be any peculiar advantage in employing this remedy under this expensive form.

OPIUM PURIFICATUM. Purified Opium. Ph. Dub.

"Take of Opium cut into small pieces, one pound; Proof Spirit, twelve pounds. Digest them with a gentle heat, stirring them frequently until the opium is dissolved: strain the tincture through paper, and distil it in a retort until the spirit is abstracted; pour out the remaining liquor, and evaporate it until the extract become of a proper consistence. Purified opium must be kept in two states, one *soft*, so as to be fit for forming pills, the other *hard*, so as to be capable of being reduced to powder."

The objections to the purification of opium by the action of water have been already stated. In this process, as the power of the solvent is greater, and the degree of heat necessary to evaporate it less considerable, it is probable that the opium will suffer less change. Still we cannot be certain of its real power in this state, and the process is expensive, and altogether superfluous.

CHAPTER XV.

AQUÆ STILLATITIÆ.—DISTILLED WATERS.

SEVERAL of the principles of vegetable matter are so far volatile as to be elevated in vapour at the temperature of 212°; hence when water is distilled from them,

it is frequently impregnated with their taste and odour, and sometimes even with their more active powers. The odour, and frequently the pungency of plants reside in their essential oil; and this being always volatile at this temperature, the aromatic plants in which essential oil is most abundant, communicate these qualities to water distilled from them, a portion of the oil being retained in solution by the water. The acrid principle of some vegetables appears likewise to be so far volatile as to rise in distillation with water; and the prussic acid, in which the narcotic power of the bitter almond, cherry laurel, and similar plants resides, is also obtained by the same process: but these vegetables are comparatively few, and there are no officinal distilled waters having a place in the Pharmacopœias possessed of any important power; they are designed, from their flavour and agreeable pungency, to serve merely as vehicles for the exhibition of more active remedies, and all of them owe these qualities to the small quantity of essential oil which they hold dissolved.

Recent vegetables are in general more proper for distillation than after being dried, the water they afford being more grateful. They are therefore ordered in this state when they can be procured in it by the Edinburgh and Dublin Colleges. The London College, on the contrary, order them to be used dried, as they cannot be procured fresh at all seasons of the year. When fresh, they in general impregnate sufficiently with their flavour and taste, three times their weight of water; when dry, double that quantity. As much must always be employed, as when drawn off by distillation a sufficient quantity shall remain in the still to prevent any part of the vegetable matter being scorched, and communicating empyreuma to the distilled water, the distillation being continued as long as the water that comes over has any taste or smell of the vegetable from which it is distilled. The flavour of the more delicate plants is injured by this operation; and these distilled waters are in general less grateful to the stomach than the infusions of the vegetable matter which yields them.

Distilled waters are liable to a species of decomposition, the nature of which has never been well determined. When long kept, they become viscid, and at the same time somewhat sour,—a proof that they hold dissolved some species of vegetable matter besides the minute portion of essential oil. To counteract this change, and preserve them more effectually in a proper state, a small quantity of alkohol, half an ounce to each pound of the distilled water, is ordered to be added to them.

AQUA DISTILLATA. Distilled Water. *Pharm. Ed. Lond. Dub.*

"Distil water in clean vessels until about two-thirds have distilled over."

Water does not occur in nature perfectly pure, but has generally a sensible impregnation of saline and earthy matter. Spring water which is purest, contains a little carbonate of lime, and muriates of lime and soda; river water contains sulphate and carbonate of lime, and muriate of soda; and well water, sulphate and carbonate of lime in larger quantity. For some purposes in Pharmacy, it is necessary to use water free from these substances, particularly in the solution of some earthy and metallic salts, several of which are decomposed by them, and if they are given in small doses, may, by such decompositions, be rendered nearly inert. In preparations too, where much water is evaporated, as in the formation of extracts, it has been judged preferable to employ distilled water, as the residual matter of common water will remain mixed with the product of the process, and uselessly add to its bulk, or even in some cases produce in it some chemical change. It is for these purposes that distilled water is ordered in the Pharmacopœias; but except where the use of it is rendered necessary from these circumstances, it ought not to be employed, as from losing in the distillation much of the air that it holds loosely dissolved, it is always vapid and unpleasant.

The process should be conducted with rather a gentle

heat, and ought not to be continued longer than until two-thirds of the water have distilled, as otherwise a minute portion of the saline matter might be brought over in the distillation.

AQUA CITRI AURANTII. Water of Orange Peel.

"Take of the rind of the Orange, fresh, two pounds. Add as much water, that when ten pounds have been drawn off by distillation, a sufficient quantity shall remain to prevent empyreuma. After due maceration, distil ten pounds."

This distilled water has none of the bitterness of the orange peel, but merely its flavour, and is so little used, that it is not kept in the shops.

In the same manner are prepared the following distilled waters:

AQUA CITRI MEDICÆ. Water of Lemon Peel,—ten pounds of water being drawn from two pounds of the fresh rind of the lemon. Like the preceding one, it has merely a slightly agreeable flavour, and is scarcely used.

AQUA CORTICIS LAURI CASSIÆ, Water of Cassia Bark.

AQUA CORTICIS CINNAMOMI. Water of Cinnamon Bark,—ten pounds of water being distilled from a pound of each bark. The cinnamon water only has a place in the London and Dublin Pharmacopœias. The cassia water, when not prepared too pungent, can scarcely, however, be distinguished from that of the cinnamon, the essential oil of both these barks having a flavour nearly the same. The cassia water, therefore, being much less expensive than the cinnamon, is always substituted for it. It has the pungency and aromatic flavour of the cassia, and is hence in very common use to cover the ungrateful taste and flavour of other medicines. It is also sometimes given alone as an aromatic and stimulant.

AQUA MENTHÆ PIPERITÆ FLORENTIS. Peppermint Water. (Aq. Menth. Piperit. *Ph. Lond. Dub.*)—

Ten pounds of water are drawn by distillation from three pounds of green peppermint. It is strongly impregnated with the flavour of the herb, and is very frequently used in mixtures to cover the flavour of other medicines. It is also frequently taken alone as a carminative.

AQUÆ MENTHÆ PULEGII FLORENTIS. Pennyroyal Water. (Aq. Pulegii, *P. Lond. Dub.*)—Ten pounds of water are distilled from three pounds of the green herb. It has a flavour and taste similar to that of the peppermint, and is used for the same purposes.

AQUA FRUCTUS MYRTI PIMENTÆ. Pimento Water. (Aq. Piment. *Ph. Lond. Dub.*)—Ten pounds of water are distilled from half a pound of the Jamaica pepper. It has the flavour of the Jamaica pepper, and its aromatic quality; but as this is not very pleasant, it is not often used.

AQUA PETALORUM ROSÆ CENTIFOLIÆ. Rose Water. (Aq. Rosæ, *Ph. Lond. Dub.*)—Ten pounds of water are drawn from six pounds of the fresh pale rose flowers. The water has all the flavour of the rose, and as it has no pungency or acrimony, it is often used for external applications, as in solutions of acetate of lead, or sulphate of zinc for collyria.

There are a few Distilled Waters peculiar to the London or the Dublin Pharmacopœias, of so little importance, however, as to require scarcely more than enumeration.

AQUA ANETHI. Dillseed Water. Ph. Lond.—Its flavour is rather unpleasant, and it has little pungency.

AQUA CARUI. Carraway Water. Ph. Lond.—This has a considerable share of aromatic flavour and pungency, and may be employed as a carminative.

AQUA FOENICULI. Fennel Water. *Ph. Lond. Dub.*—This has merely the weak flavour of the seeds, with little warmth.

AQUA MENTHÆ VIRIDIS. Spearmint Water. Ph. Lond. (Aq. Menth. Sativ. *Ph. Dub.*)—Its flavour and taste are so similar to those of peppermint or pennyroyal, that it must be regarded as superfluous.

CHAPTER XVI.

SPIRITUS STILLATITII.—DISTILLED SPIRITS.

Alkohol dissolves the essential oils of vegetables in much larger quantity than water does, and it might therefore be supposed that it may be more strongly impregnated with them by distillation, and hence possess in a much greater degree the aromatic flavour and pungency of the plant from which it is distilled. It is seldom, however, that this is the case; and from many vegetables alkohol acquires by distillation a weaker impregnation than water. This is owing to its greater volatility. All the essential oils are volatilized at a temperature of 212°, and must therefore rise with water in distillation, and impregnate it to the extent in which it can dissolve them. But there are many of them not volatilized at the temperature at which alkohol boils, and when distilled, therefore, from the plants containing them, it comes over weakly impregnated with their odour or pungency.

To obviate this, diluted alkohol, or proof-spirit as it is named, is employed in the distillation. It is macerated on the vegetable substance and is then distilled; the alkohol rises first nearly pure, but as the distillation proceeds the liquor requires always a higher temperature to cause it to boil: the vapour therefore is more largely impregnated with the essential oil, and towards the end of the distillation the whole of it is brought over with the last portion of water; and the spirit, which has previously been distilled, being mingled with this, forms a transparent solution. This forms a distilled spirit. There are at least only two in which pure alkohol is the solvent,—the spirit of lavender and spirit of rosemary, the essential oils of these plants being sufficiently volatile to be elevated at the temperature at which alkohol distils.

Distilled spirits are preparations of no great importance. Like the distilled waters they serve merely as

vehicles for the administration of more active medicines, the taste and flavour of which they cover or render more grateful; or they are occasionally employed as grateful stimulants, to relieve nausea or flatulence. The directions for preparing them are given, in the Edinburgh Pharmacopœia, under the first of them,

Spiritus cari carui. Spirit of Carraway. (Spirit. Carui, *Ph. Lond. Dub.*)

"Take of Carraway Seeds bruised, half a pound. Diluted alkohol, nine pounds. Macerate during two days in a close vessel; then add a sufficient quantity of water to prevent empyreuma, and draw off nine pounds by distillation."

In the same manner are prepared the following spirits, nine pounds being drawn from the quantities affixed to each:

Spiritus corticis lauri cinnamomi. Spirit of Cinnamon. *Ph. Ed. Lond. Dub.* (Bark of Cinnamon, one pound).

Spiritus menthæ piperitæ florentis. Spirit of Peppermint. *Ph. Ed. Lond. Dub.* (Herb of peppermint, one pound and a half).

Spiritus nucis myristicæ moschatæ. Spirit of Nutmeg. *Ph. Ed. Lond. Dub.* (Nutmeg bruised, two ounces).

Spiritus fructus myrti pimentæ. Spirit of Pimento. *Ph. Ed. Lond. Dub.* (Fruit of pimento, bruised, half a pound).

To these may be added the following from the London Pharmacopœia, which are prepared in the same manner:

Spiritus anisi. Spirit of Anise.

Spiritus menthæ viridis. Spirit of Spearmint.

Spiritus pulegii. Spirit of Pennyroyal.

All these spirits have the aromatic flavour, and to a

certain extent the pungency of the vegetables from which they are prepared. They require, therefore, no particular observations.

Of Compound Spirits, the following have a place in the Pharmacopœias:

Spiritus juniperi communis compositus. Compound Spirit of Juniper. *Ph. Ed. Lond. Dub.*

"Take of Juniper Berries bruised, one pound; Carraway Seeds, Fennel Seeds, of each bruised one ounce and a half; Diluted Alkohol, nine pounds. Macerate for two days; and, having added as much water as is sufficient to prevent empyreuma, draw off nine pounds by distillation."

This is a grateful cordial spirit, which has been used as a carminative, and as a stimulant and diuretic in dropsy.

Spiritus anisi compositus. Compound Spirit of Anise. Ph. Dub.

"Take of Anise Seeds, Angelica Seeds, of each bruised half a pound; Proof-Spirit, one gallon; Water as much as is sufficient to prevent empyreuma. Distil one gallon."

This is similar to the preceding spirit, milder and perhaps less grateful. It has also been used as a carminative.

Spiritus armoraciæ compositus. Spirit of Horse-Radish. Ph. Lond. (Spiritus Raphani Compositus, *Ph. Dub.*)

"Take of fresh Horse-Radish root cut, dried Orange Peel, of each one pound; Nutmegs bruised, half an ounce; Proof-Spirit, a gallon; Water, as much as is sufficient to prevent empyreuma. Macerate for twenty-four hours, then distil a gallon with a slow fire." There was formerly in this composition two pounds of fresh scurvy grass, and this is still retained by the Dublin College.

This compound spirit was formerly recommended as an antiscorbutic. It has justly fallen into disuse.

THERE remain, lastly, those Distilled Spirits prepared with Pure Alkohol.

SPIRITUS LAVENDULÆ SPICÆ. Spirit of Lavender. *Ph. Ed. Lond. Dub.*

"Take of fresh Lavender Flowers, two pounds; Alkohol, eight pounds. Draw off seven pounds by distillation with the heat of a water-bath."

This oil of Lavender is sufficiently volatile to be elevated with alkohol in vapour, and it is completely dissolved by it. The spirit is used principally as a grateful stimulating perfume, which gives relief in headach, drawn up the nostrils, or applied to the forehead.

SPIRITUS LAVENDULÆ COMPOSITUS. Compound Spirit of Lavender. *Ph. Ed. Lond. Dub.*

"Take of Spirit of Lavender, three pounds; Spirit of Rosemary, one pound; Cinnamon Bark bruised, one ounce; Cloves bruised, two drachms; Nutmeg bruised, half an ounce; Red Saunders Wood rasped, three drachms. Macerate seven days and strain." In the formula given by the London College the cloves are omitted.

This tincture is a grateful cordial and stimulant in common use, for relieving languor and faintness. Its dose is thirty or forty drops, taken on a piece of sugar or in a cupful of water.

SPIRITUS RORISMARINI OFFICINALIS. Spirit of Rosemary. *Ph. Ed. Lond. Dub.*

"Take of Fresh Rosemary Tops, two pounds; Alkohol, eight pounds. Draw off seven pounds by distillation by the heat of boiling water."

The London College employ diluted alkohol in the preparation of this spirit.

Spirit of Rosemary is a very fragrant perfume, and is in common use for the same purposes as the simple Spirit of Lavender.

ALKOHOL. Alkohol. Spiritus Vinosus Rectificatus. Rectified Spirit of Wine.

There is no process given in the Edinburgh Pharmacopœia for the preparation of alkohol. It is supposed to be procured from those who prepare it on a large scale, and is inserted in the catalogue of the articles of the Materia Medica, as of the specific gravity .835, this being a strength at which it can be procured without difficulty, and being sufficient for any purpose to which it requires to be applied in Pharmacy. It is procured of this strength from any of the spiritous liquors of commerce by slow distillation with a gentle heat, a portion of sub-carbonate of potash heated being previously added to abstract the water more effectually from the spirit. It is usually submitted to a second distillation, and a little alum is frequently added previous to this, to remove any of the alkali which might be held in solution in the spirit obtained by the first distillation.

The London and Dublin Colleges, while they have also inserted alkohol of this strength, under the name of Rectified Spirit, in the catalogue of the articles of the Materia Medica, have given a process to obtain it more concentrated for particular purposes. The following are the directions in the London Pharmacopœia:

Take of Rectified Spirit a gallon; Sub-carbonate of Potash, three pounds. To the spirit add a pound of the sub-carbonate of potash previously heated to 300 degrees, and macerate for twenty-four hours, shaking frequently; then to the spirit poured off, add the remaining portion of the sub-carbonate of potash heated to the same degree; lastly, distil the alkohol from a water-bath, and preserve it in a vessel well stopped. The specific gravity of alkohol is to that of distilled water as 815 to 1000.

The process in the Dublin Pharmacopœia is nearly the same. A gallon of rectified spirit is mixed with an ounce of pure potash; a pound of the potash of commerce heated is added, and they are digested in a close vessel for three days, being frequently agitated: to the spirit

poured off, half a pound of dried muriate of lime is added, and it is distilled with a gentle heat. The specific gravity of the product is .815.

The concentration of the alkohol in both processes is obviously obtained by the action of substances having a strong affinity to water,—the sub-carbonate of potash, and the muriate of lime; these attract it from the spirit, and counteract its volatility so as to prevent it rising in the distillation. The muriate of lime exerts this agency most powerfully; and by repeated distillation from it, alkohol has been brought to its highest state of concentration, its specific gravity being so low as .800 or .798, at the temperature of 60°. Alkohol, rectified even so highly as is ordered by the London and Dublin Colleges, is required for very few pharmaceutic processes; and hence, in the greater number of their officinal preparations, rectified spirit, that is, alkohol of the specific gravity of .835, is directed to be employed. The proof spirit of the Edinburgh College, formed from equal parts of rectified spirit and water, is of the specific gravity of .935. That of the London and Dublin Colleges is stated at .930, and will be obtained of this strength by mixing four parts by measure of rectified spirit with three parts of water. The properties of alkohol as an agent in pharmacy, and its medicinal applications, have been already enumerated.

CHAPTER XVII.

OLEA VOLATILIA, OLIM OLEA STILLATITIA VEL ESSENTIALIA.—VOLATILE OILS, FORMERLY DISTILLED OR ESSENTIAL OILS.

Essential oil, as a proximate principle of vegetables, has already been considered, and its distinctive properties pointed out. As yielded by different vegetables, its chemical characters are nearly uniform; but the

oils of different plants vary in their sensible qualities, particularly in those of colour, consistence, odour, and taste. Their odour is that of the plant from which they are procured; their taste also is frequently the same, particularly in those plants named aromatic, and it is always pungent and acrid; their colours are shades of yellow, green and brown; they are usually liquid, but sometimes of a thick consistence.

In a few cases, these oils, existing in distinct vesicles, can be obtained by expression. Usually they are diffused through the vegetable matter, so as to render this impracticable; they are then obtained by distillation; the plant being distilled with a portion of water, not larger than what is necessary to avoid empyreuma. The oil is volatilized with the watery vapour; and though a portion remains dissolved, yet from the sparing quantity of water employed, the greater part is collected apart, either, according to its specific gravity, floating on the surface, or having subsided to the bottom. In performing the operation in the large way, the same water is repeatedly put into the still, by which the loss from the oil being dissolved is in a great measure avoided. The product of oil is very different from different plants; and it is to be remarked, that the most odorous and pungent plants do not afford the largest quantity, even where the oil is the principle in which the odour or pungency resides;—the petals of the rose for example, or the bark of cinnamon, affording a quantity extremely small, though in the one of these the oil has the entire flavour of the flower, and the other the aromatic warmth of the bark. The quantity and quality of the oil are also influenced by the circumstances of climate, soil and season; the rich aromatic oils being generally more fragrant from the plant when growing in a warm climate and dry soil, than under the reverse of these; and the oil afforded by the aromatic vegetables of this climate is in general stronger, and in larger quantity, in a dry than in a wet season. The oil at its first distillation has frequently an odour less grateful than after it has been kept for some time: by age, however, its flavour is improved. If the

air has not been carefully excluded it at length becomes thick; some deposite a little camphor, and others, when distilled anew, yield an oil similar to the original, a resinous substance being left.

The essential oils of commerce are sometimes adulterated, either by the addition of a cheaper oil, as that of turpentine, of an expressed oil, or of alkohol. These frauds are easily detected,—the first, by the smell, when the adulterated oil is dropped on paper, and heated so far as to be volatilized; the second, by the oil forming a greasy spot when dropped on paper, which remains so even after heat has been applied; the third, by the oil, when dropped on water, forming a milky, instead of a transparent film on the surface of the water.

Essential oils are seldom applied to answer any important indication, having scarcely any other powers than those of aromatic warmth and pungency. If used alone to relieve flatulence or nausea, they may be diffused in water by the medium of mucilage and sugar, or dissolved in alkohol, and the solution diluted with water. More generally they are employed as corrigents, to improve the taste and flavour of ungrateful medicines, to cause these to sit easier on the stomach, or to obviate nausea, or any unpleasant symptom they may be liable to produce.

The following general rules with regard to the preparation of these oils are given in the Edinburgh Pharmacopœia. "These oils are to be prepared in the same manner as the Distilled Waters, except that a smaller quantity of water is to be added. Seeds and roots are to be previously bruised or rasped. The oil is brought over with the water, and, according as it is lighter or heavier, floats on the surface, or falls to the bottom, and is afterwards separated.

"It is also to be observed with regard to the preparation of distilled waters and oils, that, according to the quality of the substances, their texture, the season of the year, and similar circumstances, so many differences must arise, that it is scarcely possible to give any certain

and general rules which shall apply strictly to every example. Many things therefore are omitted, to be regulated according to the judgment of the operator, the most general precepts only being delivered."

To the general rules given by the London and Dublin Colleges, which are similar, it is added, that the water which is produced in the distillation of the oils of carraway, peppermint, spearmint, pennyroyal, pimento, and sweet fennel, may be preserved for use, as it is sufficiently impregnated with the essential oil.

The following oils are those inserted in the Edinburgh Pharmacopœia, and, with the exception of the oils of savin and sassafras, they have a place likewise in the London and Dublin Pharmacopœias.

Oleum baccarum juniperi communis. Oil of Juniper.—When genuine, this oil has the flavour of the juniper berries, and is soluble in alkohol. There is generally substituted for it in the shops an oil distilled from some species of turpentine much less grateful, which alkohol does not dissolve.

Oleum juniperi sabinæ. Oil of Savine.—This plant yields more essential oil than any other does, two pounds affording not less than five ounces. The virtues of the savine seem also to depend on it, as the essential oil is said to be a powerful emmenagogue, in a dose from three to ten drops. It is however very little used.

Oleum spicarum florentium lavandulæ spicæ. Oil of Lavender.—This oil is used principally on account of its flavour.

Oleum radicis lauri sassafras. Oil of Sassafras.—This is the heaviest of the essential oils; its odour is somewhat fragrant, and its taste warm, but it has no quality that renders it of much value.

Oleum herbæ menthæ piperitæ florentis. Oil of Peppermint.—This is one of the most pungent of the essential oils, and at the same time excites a peculiar sensation of coolness. It is a common and convenient remedy to relieve flatulence and anorexia, under the form of what is named Essence of Peppermint,—

a solution of one part of the oil in seven parts of alkohol; the dose of this being fifteen or twenty drops in a cupful of water.

Oleum fructus myrti pimentæ, Oil of Pimento.—This oil, having the flavour of the Jamaica pepper, is sometimes used on account of this flavour.

Oleum seminum pimpinellæ anisi. Oil of Anise.—This oil is of a light colour, and has rather an unpleasant smell. It congeals even at a very moderately cold temperature. It has less pungency than any of the other essential oils, and is therefore well adapted to the purpose to which it is usually applied, that of relieving flatulence and the symptoms arising from it in children, a little of it being rubbed with sugar, and mixed with the child's food. The common proportion is ten or fifteen drops of the oil to two ounces of sugar.

Oleum summitatum florentium rorismarini officinalis. Oil of Rosemary.—The odour of this oil is less grateful than when it is diluted with alkohol in the form of spirit of rosemary. It is sometimes used in ointments as a perfume, and it enters as a stimulant into the composition of the soap liniment.

Besides these, a few other Volatile Oils have a place in the London and Dublin Pharmacopœias.

Oleum anthemidis. Oil of Chamomile. Ph. Lond. —This oil has an unpleasant flavour, and is applied to no use.

Oleum carui. Oil of Carraway. *Ph. Lond. Dub.*— This is one of the most grateful of the essential oils, and well adapted to act as a carminative, or to communicate an agreeable pungency, and cover the flavour of unpleasant remedies.

Oleum menthæ viridis. Oil of Spearmint. *Ph. Lond. Dub.*—The flavour of this oil is similar to that of peppermint, rather less grateful, and its taste is less pungent.

Oleum origani. Oil of Origanum. *Ph. Lond. Dub.* —This is occasionally used as a perfume, though less grateful than the oil of lavender.

Oleum pulegii. Oil of Pennyroyal. Ph. Lond.—This oil resembles the oil of peppermint and spearmint, and may be regarded as superfluous.

Oleum foeniculi dulcis. Oil of Sweet Fennel. Ph. Dub.—The flavour of this oil is similar to that of Anise.

Oleum rutæ. Oil of Rue. Ph. Dub.—The flavour of oil of rue is ungrateful, and though it has been regarded as an emmenagogue, it is altogether discarded from use.

Under the Chapter of Volatile Oils are inserted some other preparations besides the Essential Oils of Plants.

Oleum succini et acidum succini. Oil of Amber and Acid of Amber. (Ol. Succini, *Ph. Lond. Dub.*—Acid. Succini, *Ph. Dub.*)

"Take of Amber in powder, Pure Sand, equal parts. Put them mixed together into a glass retort, of which they shall fill one half. Having adapted a large receiver, distil from a sand-bath, with a fire gradually raised. First, a watery liquor with a little yellow oil will distil over; then a yellow oil with an acid salt; afterwards, a reddish and black oil. Pour the liquor out of the receiver, and let the oil be separated from the water. Let the acid salt, collected from the neck of the retort and the sides of the receiver, be pressed between folds of bibulous paper, and freed from the adhering oil. Then purify it by solution in hot water and crystallization."

Oleum succini purissimum. Purified Oil of Amber.

"Distil Oil of Amber mixed with six times its weight of Water, from a glass retort, until two-thirds of the water have passed into the receiver. Then separate this purified volatile oil from the water, and keep it in vessels well stopped."

The Dublin College retain both the Acid and Oil of

Amber, and give nearly the same directions for their preparation. The London College admit the oil only.

Amber is a bituminous substance found in the layers of bituminated wood, or in fragments or masses on the sea-shore in different countries, the origin or natural formation of which is not well ascertained. It is also possessed of peculiar characters; for although it approaches to the vegetable resins in a number of its properties, it differs in others, and differs remarkably in the products it affords when decomposed by heat. These products are an acid *sui generis*, which being procured from no other substance, receives from this bitumen the name of Succinic Acid; and a peculiar empyreumatic oil. The process is conducted according to the directions given in the Pharmacopœia. The heat requires to be raised gradually, and the interposition of the sand is useful by dividing the particles of amber, and preventing it, when it melts, from swelling up, and passing over into the receiver.

The succinic acid is in part dissolved by the water which condenses in the receiver, but the greater part is condensed in the form of a crust. When purified from the adhering oil, it is obtained in minute crystals, rhomboidal plates, of a brownish colour from a little oil still adhering to it; these are rather sparingly soluble in water, requiring 24 parts at 60° for their solution: the taste of this acid is penetrating and slightly sour; it reddens the vegetable colours, is soluble in alkohol, volatile and inflammable. In medicine it has been regarded as an antispasmodic and diuretic; but it appears to be wholly inactive, and is altogether discarded from practice.

The oil of amber procured by the first distillation is thick, of a dark brown colour, and a very fœtid smell; by successive distillations it is obtained of a thinner consistence and lighter colour, and can at length be rendered nearly limpid. Its smell still remains, however, peculiar, and ungrateful: its taste is hot and acrid; it is volatile and inflammable, insoluble in water, and sparingly soluble in alkohol. In medical practice it has been

celebrated as a stimulant and antispasmodic, and has been given in amenorrhœa and hysteria in a dose from ten to fifteen drops. Its internal administration is, however, entirely relinquished. Externally it is sometimes applied by friction as a stimulant in paralysis, and to relieve the pain of cramp and rheumatism; but its strong unpleasant smell renders the application extremely disagreeable.

Oleum volatile pini purissimum, *olim Oleum Terebinthinæ purissimum*. Rectified Oil of Turpentine. (Oleum Terebinthinæ Rectificatum, *Ph. Lond. Dub.*)

"Take of Oil of Turpentine, one pound; Water, four pounds. Distil as long as any oil passes over."

The oil of turpentine of commerce is obtained by distillation from what is named Common Turpentine, the juice of the *Pinus Larix*, or sometimes from the wood of the tree. It appears to contain a small portion of resinous matter, as when distilled it leaves a little of a thick residuum, and the distilled oil has been said to be more volatile. The process, however, is difficult to perform, from the great volatility of the oil, and the diffusibility of its vapour; it is one too wholly superfluous, the common oil being sufficiently pure for any purpose to which it requires to be applied in medicine, and it is accordingly never attended to in the shops. The medicinal properties of this oil have been already considered.

Oleum cornu cervini rectificatum. Rectified Oil of Hartshorn. Ph. Dub. (Oleum Animale. Animal Oil.)

"Take of the Oil which rises in the distillation of the volatile liquor of Hartshorn, three pounds; Water, six pounds. Distil the oil, mix it again with water, and distil it a second time; repeat this operation frequently until it become limpid. It must be kept in small phials quite filled with it, closely stopped, and in a dark place."

Animal substances submitted to heat suffer decomposition, their elements entering into new combinations, and one of the principal products of these combinations

is empyreumatic oil, formed from the combination of portions of the hydrogen and carbon of the animal matter. This product is obtained abundantly in the decomposition of bone or horn by heat, along with the carbonate of ammonia formed in the same process. It is at first thick, of a dark brown colour, and offensive odour: but by repeated distillations from water it is rendered thinner, more limpid, and less offensive. In this rectified state it has been celebrated as a stimulant and antispasmodic, but is discarded from modern practice.

CHAPTER XVIII.

OLEOSA.—OILY PREPARATIONS.

THE preparations included in this chapter, under this name, are combinations of expressed oils with more active substances, principally designed for external application, the oil moderating their action, or communicating a convenient form.

OLEUM AMMONIATUM, *vulgo Linimentum Volatile.* Ammoniated Oil, commonly called Volatile Liniment.

"Take of Olive Oil, two ounces; Water of Ammonia, two drachms. Mix them." The same preparation has a place in the Dublin Pharmacopœia, under the name Linimentum Ammoniæ. In the London Pharmacopœia, a stronger preparation is ordered, LINIMENTUM AMMONIÆ FORTIUS, consisting of Water of Ammonia, half an ounce; Olive Oil, two ounces. Another is inserted under the title LINIMENTUM AMMONIÆ CARBONATIS, composed of Water of Carbonate of Ammonia, half an ounce; Olive Oil, three ounces, which, both from the nature and proportion of its ingredients, is milder.

In these compositions, the alkali combines with the expressed oil, forming a thick white saponaceous com-

pound. They are all used as rubefacients, and are convenient for application; a piece of linen moistened with any of them being applied to the part, or sometimes friction being made with the liniment for a short time. The composition of the Edinburgh College seems on the whole best adapted to general use, as of medium strength, and, if necessary, it is easy to render it a little more active.

Oleum camphoratum. Comphorated Oil. (Linimentum Camphoræ, *Ph. Lond.*—Ol. Camph. *Ph. Dub.*)

"Take of Olive Oil, two ounces; Camphor, half an ounce. Mix them, so as that the camphor may be dissolved."

This is a form under which camphor is frequently applied externally as a stimulant and anodyne, and is the most convenient one, when it is to be applied by friction. It is sometimes rendered more active by the addition of a little ammonia.

Oleum sulphuratum. Sulphurated Oil. (Oleum Sulphuratum. *Ph. Lond.*)

"Take of Olive Oil, eight ounces; Sublimed Sulphur, one ounce. Boil with a gentle fire, in a large iron pot, stirring constantly until they unite." In the London Pharmacopœia, the proportion of sulphur is two ounces to eight of oil.

This process, though apparently simple, is attended with some difficulty, the oil being very liable to boil over, or its vapour to catch fire. It is one too unnecessary, for although the composition has been recommended in catarrh, asthma, and phthysis, it has fallen altogether into disuse. It is extremely acrid and offensive. When employed, it was given in a dose from ten to thirty drops.

CHAPTER XIX.

SALES ET SALINA.—OF SALTS AND SALINE SUBSTANCES.

The term Salt has long been employed, in chemical language, to denote an extensive order of substances; yet it is difficult to assign to it a precise definition, or to distinguish these by characters at once sufficiently comprehensive and appropriate. It is from a combination of the following properties, however, that the definition has been attempted to be formed.

Salts are said to be bodies eminently sapid, or which excite a strong penetrating taste when applied to the tongue. Many of them have indeed this power, but there are others, particularly among the earthy salts, in which any degree of sapidity is scarcely perceptible, while there are many bodies eminently sapid which are not of a saline nature.

2d. All salts are supposed soluble in water, and this, strictly speaking, is perhaps true; but in many of them, the degree of solubility is so inconsiderable, that it can scarcely be assigned with propriety as a distinctive character of the order. Sulphate of barytes, for example, is not soluble in five thousand times its weight of water, and there are several others nearly equally insoluble.

3d. Salts are said to be capable of assuming a crystalline form. When dissolved in water, many of them, on evaporation of part of the water, concrete into regular crystals. But there are others which, either from being sparingly soluble in that fluid, or from having a strong attraction to it, cannot be made to crystallize; while there are substances crystallizable even from their watery solution, sugar, for example, not saline.

4th. Salts are said to be fusible by the application of heat. But the same character may be assigned to every other fossil substance, the pure earths excepted; and

there are besides many salts, which, instead of being fused, are decomposed in a high temperature.

Lastly, Salts have been considered as uninflammable; and many of them must be so, as they are formed of substances already saturated with oxygen; but there are many others, as ammonia and the vegetable acids, as well as the compounds of these, which are more or less inflammable; some of them even burn with a bright flame.

It is evident, therefore, that those properties which have been assigned as the characters of the order, are not possessed by every substance which, in chemical arrangements, is regarded as saline, but that, on the contrary, the exceptions are very numerous. Neither are they possessed exclusively by these substances; there being bodies not saline which are sapid, soluble in water, fusible by heat, uninflammable, and which have even a tendency to assume the crystalline form.

The characters of this order, therefore, are now drawn rather from the chemical composition of the substances arranged under it. It is thus understood as comprehending the acids, the alkalis, and the compounds resulting from the combination of acids with alkalis, earths, and metallic oxides. The acids and alkalis are named Simple or Primitive Salts; the others Secondary, or more commonly Neutral Salts, as in general the properties of the acid, and of the alkali, earth, or metal of which they are formed, are neutralized or lost. These are the substances comprised under the present chapter, with a few associated with them for convenience, though not strictly connected with them. They are generally speaking preparations of importance, but differing so widely in chemical constitution and medicinal powers, as to admit of no general observation.

ACIDUM ACETOSUM DESTILLATUM. Distilled Acetous Acid. (Acid Aceticum, *Ph. Lond.*—Acetum Distillatum, *Ph. Dub.*)

"Distil eight pounds of Acetous Acid in glass vessels, with a slow fire. The two pounds that first come

over are to be rejected as too watery; the four pounds which follow are the distilled acetous acid. The residuum affords a still stronger acid, but too much burnt." The London College order the first pound only to be rejected, and the distillation to be continued until seven pounds have distilled over. The proper name of the acid thus obtained is Diluted Acetic Acid.

Vinegar, Acetous Acid as it is named by the College, as it is produced by fermentation, consists of acetic acid, largely diluted with water, and mixed with a number of other substances,—tartaric acid, extractive, mucilaginous, and saccharine matter. From these it is purified by distillation, but it is still largely diluted with water; the distilled liquor is indeed even weaker than the vinegar itself, a larger portion of the acid remaining in the residual liquor; and, in general, it receives from the distillation somewhat of an empyreumatic odour. It is usual, on the large scale, to perform the distillation in a tin still, connected with a tin spiral tube in a refrigeratory, and to add portions of boiling water during the distillation, so as to dilute the residual liquor, and bring over the whole of the acid. The process, however, ought to be conducted in glass vessels, as directed in the Pharmacopœia; as, from metallic ones, (tin, which has been employed, being often alloyed with lead), the acid may receive an impregnation that might prove noxious.

Distilled acetous acid is colourless, not very sour to the taste, usually slightly empyreumatic, and of a specific gravity of 1006. It is chiefly employed as a solvent of some vegetable substances, and in making some of the salts. Sometimes it is applied externally, in preference to common vinegar, as a discutient, and as an application to burns. It has the advantage, as a pharmaceutic agent, not only of greater purity, but of not being liable, like undistilled vinegar, to spontaneous decomposition.

ACIDUM ACETOSUM FORTE. Strong Acetous Acid.

"Take of Dried Sulphate of Iron, one pound; Acetate of Lead, ten ounces. Rub them together. Put them into a retort, and distil from sand with a moderate fire, as long as any acid comes over."

ACIDUM ACETICUM. Acetic Acid. Pharm. Dub.

"Take of Acetate of Potash, six ounces; Sulphuric Acid, three ounces. Put the acid into a tubulated retort, and add to it gradually, and in different portions, the acetate of potash, allowing the mixture to cool after every addition; then distil the acid with a moderate heat, until the residuum is dry. The specific gravity of this acid is to that of distilled water as 1070 to 1000."

These are two processes for obtaining acetic acid in a concentrated state, and others have been likewise employed. One giving perhaps a stronger acid than either of them, has been long in use, and had a place in the former edition of the London Pharmacopœia. It consists in exposing verdigris, which is a sub-acetate of copper, well dried, to a heat gradually raised, and purifying the acid which distils over by a second distillation; the high temperature in this process merely expelling the acetic acid from the metallic salt. In the process of the Edinburgh Pharmacopœia, the expulsion of the acetic acid from the acetate of lead is favoured by the affinity exerted to the oxide of lead by the sulphuric acid of the sulphate of iron; and as the salts are dried, or contain little water of crystallization, the acid is supposed to be obtained in a concentrated state. In the process given by the Dublin College, the sulphuric acid combines with the potash of the acetate of potash, and disengages the acetic acid. This distils over, and as the acetate of potash contains little water, and the water of the sulphuric acid must be in part retained by the affinity exerted to it by the sulphate of potash, the acetic acid is obtained in a concentrated form.

Chemists had observed some difference of properties

between the acetic acid obtained from the decomposition of verdigris by heat, radical vinegar as it was named, and the acid of vinegar purified by distillation, and concentrated by freezing, or obtained in a concentrated state by the decomposition of an acetate having an alkaline or earthy base. They were therefore regarded as chemically different; the one, that obtained from the metallic salt, was believed to be more highly oxygenated, in consequence of receiving, it was supposed, oxygen from the metallic oxide, and was named Acetic Acid; while the other, to denote its relation to this, was named Acetous Acid. At a later period, it was supposed that they differed rather in the proportion of carbon existing in their base. But the experiments, first of Adet, and since of Darracq, have proved, that they differ merely in degree of concentration, (that expelled from the metallic salt by heat being strongest), and sometimes in a small quantity of extractive matter adhering to the acid concentrated by freezing. When freed from this, and when brought to the same specific gravity by diluting the stronger, they have the same properties, display the same affinities, and afford the same products by analysis. There is therefore only one acid, the Acetic, and the name Acetous is not properly applied.

The process of the Edinburgh College affords an acid not so highly concentrated, and therefore not so pungent as that in which it is procured by exposing verdigris to heat. That procured by the process of the Dublin College is rather stronger; and it has the advantage of not being liable to be contaminated by any metallic impregnation. It is also free from sulphurous acid, with a portion of which the others are sometimes impregnated. A process, which would afford it equally pure, and probably stronger, would be to decompose the solid acetate of lime by sulphuric acid, as the sulphate of lime, by its strong affinity to water, would detain it; or the acid may be brought to the highest state of concentration, by distilling it from dry muriate of lime.

Acetic acid, in its highly concentrated state, has a

fragrant, and, at the same time, very sharp penetrating odour; its taste is extremely sour and pungent, and it is so acrid as to inflame the skin. It is highly volatile, evaporating at the common temperature of the atmosphere: it is also inflammable when a burning body is approached to its vapour. It exerts the agencies of a powerful acid, and it has a very peculiar action on several of the proximate principles of vegetables, whence it can be applied to pharmaceutical purposes,—dissolving them, without decomposing them, or materially altering their properties. It thus dissolves resins, gum-resins, camphor, and essential oils. It is employed medicinally, principally as a stimulating perfume in languor or faintness, or to obviate the unpleasant smell of confined or corrupted air. The combination of it with camphor is principally used for this purpose, as has been noticed under the chapter of medicated vinegar, in which a preparation of this kind has a place.

Acidum benzoicum. Benzoic Acid.

"Take of Benzoin, twenty-four ounces; of Carbonate of Soda, eight ounces; Water, sixteen pounds. Boil the benzoin, rubbed with the carbonate, in water for an hour, stirring them constantly, and strain. Boil the residual balsam in other six pounds of water, and strain. Mix this when strained with the former liquor, and evaporate until two pounds remain. Strain again, and drop into the liquor, as long as there is any precipitation, diluted sulphuric acid. Dissolve the precipitated benzoic acid in boiling water. Strain the liquor while hot, through linen, and put it aside, that crystals may form. These crystals being collected, and washed with cold water, dry and preserve them."

The same process nearly is followed by the London College, lime being substituted for carbonate of potash, and muriatic acid for sulphuric acid. A pound and a half of benzoin are boiled with four ounces of recently prepared lime, in a gallon of water, for half an hour, stirring them constantly. This being poured off, the re-

maining matter is boiled in four pints of water; the two portions are mingled together, and reduced, by evaporation, to one half, and into this, when strained, muriatic acid is dropt in as long as there is any precipitation. The precipitate is dried by a gentle heat, and being put into a proper vessel, the acid is sublimed by a slow fire.

The Dublin College have retained the old process of sublimation for procuring this acid. The benzoin is melted in a wide-necked retort, to which a receiver is adapted without being luted, and it is sublimed with a moderate heat. The sublimed matter condensing in the neck of the retort is removed occasionally, that it may not accumulate in too great quantity. If stained with oil, it is to be pressed, wrapped up in bibulous paper, which will absorb the oil, and is to be again sublimed.

Benzoic acid exists in the various balsams, in benzoin, in largest quantity; and it is procured without difficulty, by sublimation, from the application of a moderate heat. It is this process that has been generally employed; the other methods are introduced as more economical. In the process of the Edinburgh College, the acid of the benzoin combines with the soda of the carbonate of soda, forming a soluble salt; the sulphuric acid when added, combines with the soda, and the benzoic acid, being sparingly soluble in cold water, is precipitated. The process given by the London College is essentially the same; the benzoic acid combining with the lime, and forming a soluble salt: this cannot, however, be decomposed by sulphuric acid, as the sulphate of lime would be precipitated with the acid; muriatic acid, therefore, is added, which combines with the lime; the muriate of lime remains dissolved, and the benzoic acid is thrown down.

The quantity of benzoic acid obtained by sublimation is greater than can be obtained by the other methods, the product, according to Mr. Brande's experiments, amounting to two ounces from a pound of benzoin, while, according to the others, it is equal only to from one ounce five drachms, to one ounce six drachms and

a half. But there is a difficulty in conducting the process by sublimation, from a portion of the oily matter of the benzoin being liable to rise with the acid in vapour, and communicating to it a brown tinge. By managing the heat, however, with due precaution, and changing the receiver towards the end of the sublimation, this may be avoided, at least so far as to obtain a pure product, nearly equal in quantity to that from the other methods; and as the sublimed acid is more white and brilliant than the precipitated acid, even when the latter is dissolved and crystallized, this method is still usually followed by the practical chemist. The London College give the precipitated acid the same brilliant appearance by sublimation.

Benzoic acid is in slender needle-like crystals, or in soft flakes, of a white colour and silky lustre; its taste is pungent and acidulous, its odour aromatic, and when it is heated, penetrating: this odour, however, appears to arise from a minute portion of oily matter adhering to it, as by dissolving the acid in alkohol, and precipitating it by water, it is obtained nearly inodorous. It is volatile and inflammable, is scarcely sensibly soluble in cold water, but is dissolved abundantly by hot water, and is also soluble in alkohol. It has been regarded as a stimulating expectorant, but is totally destitute of medicinal efficacy, and the sole consumption of it is in the composition of the paregoric elixirs of the Pharmacopœias, in which, as it has long been an ingredient, it is still retained.

The London College have given a formula for obtaining another vegetable acid, the Citric.

Acidum citricum. Citric Acid.

"Take of Lemon Juice, a pint; Prepared Chalk, an ounce, or as much as may be sufficient to saturate the juice; Diluted Sulphuric Acid, nine fluid ounces. Add the chalk to the lemon juice heated, and mix them; then pour off the liquor. Wash the citrate of lime which re-

mains with water, frequently added; then dry it. To the dried powder add the diluted sulphuric acid; boil for ten minutes; express the liquor strongly through linen, and strain through paper. Evaporate the strained liquor so far, that on cooling, crystals shall form. To obtain these crystals pure, dissolve them in water a second and third time; strain the solution each time; evaporate, and put it aside to crystallize."

The juice of the lemon consists principally of citric acid, from which, however, as has been already remarked, it is difficult to abstract the mucilaginous and extractive matter, so as to render it capable of being preserved. Hence the process of obtaining the acid in a pure crystallized form, originally proposed by Scheele, has been introduced. The lime of the carbonate of lime, added to the lemon juice, combines with the citric acid, forming an insoluble precipitate, which falls down: this is washed to carry off the adhering vegetable matter, and is submitted to the action of diluted sulphuric acid: the sulphuric acid combines with the lime, and disengages the citric acid; this, dissolved by the water, is pressed out from the sulphate of lime, and by the evaporation of the solution is brought to crystallize. The crystals are at first of a brownish tinge, from the re-action, it has been supposed, of the sulphuric on the citric acid. By a second or third solution and crystallization they are obtained colourless, or rather white. A slight excess of sulphuric acid, Scheele found to be useful; and its operation, as Dize has remarked, consists in decomposing a little mucilage or extractive matter, which adheres to the citric acid, and opposes its crystallization. It remains in the residual liquor without rendering the crystals impure.

Citric acid crystallizes in rhomboidal prisms; it is easily soluble in water, has a taste extremely sour, and reddens deeply the vegetable colours. In its solid state it remains unchanged, and even in solution is not very liable to spontaneous decomposition. It is used, as has already been remarked, as a refrigerant. A grateful

lemonade is prepared from it, by dissolving 30 or 40 grains in a pint of water, with the addition of a little sugar, an agreeable flavour being communicated by a little dried lemon peel having been infused in the water, or a powder formed by rubbing sugar on the fresh lemon being dissolved in it. It is used, too, in forming the common effervescing draught, being mixed with carbonate of soda, and water added. Whether it acts with equal certainty with the recent juice, as a remedy in scurvy, remains to be ascertained.

Acidum muriaticum. Muriatic Acid.

"Take of Muriate of Soda, two pounds; Sulphuric Acid, sixteen ounces; Water, one pound. First expose the muriate of soda in a pot to a red heat for a short time; when cold, put it into a retort. Then pour the acid, mixed with the water, and cold, on the muriate of soda. Distil from a sand-bath with a moderate fire, as long as any acid comes over. The specific gravity of the acid is to that of distilled water as 1170 to 1000."

The process in the other Pharmacopœias is nearly the same, the proportions of the ingredients being different. In the Dublin Pharmacopœia, the same weight of sulphuric acid as of muriate of soda is ordered, and the acid is diluted with an equal weight of water. In the London Pharmacopœia, two pounds of muriate of soda are put into a retort, with a pound and a half of sulphuric acid diluted with a pint and a half of water. It would require comparative experiments to determine the best proportions; but it is not improbable, that in the formula of the Edinburgh College, the proportion of acid is too small, chemists having been formerly led into error in cases similar to this, by supposing, that in decomposing a compound salt by an acid, there is no advantage in adding more of the decomposing acid than is necessary to neutralize the quantity of base which the portion of salt operated on contains, not knowing the influence of quantity in adding to the force of chemical affinity. We now know, that in every case

of this kind the product is increased by employing more of the decomposing agent than is strictly necessary to neutralize the ingredient with which it combines; and that if this excess be not employed, a portion of the compound operated on is not decomposed. I have accordingly observed, in performing the above process, according to the formula of the Edinburgh College, that a portion of undecomposed muriate of soda exists in the residual mass. The cake remaining in the retort is easily dissolved by pouring water on it when the retort is perfectly cold, and its solution is favoured by the excess of acid in its composition.

The London College direct that the sulphuric acid be diluted only with a portion of the water, and that the remaining water be put into the receiver. This is proper, both as abridging the distillation, and assisting the condensation of the acid gas. An apparatus, on the construction of Woolfe's, is sometimes employed, but is unnecessary, as a range of two or three receivers, without tubes immersed in the liquid in each, is sufficient. The advantage of diluting the acid with at least a portion of the water, is, that the rapid effervescence and disengagement of gas produced by the action of the concentrated acid on the muriate of soda is prevented, and the process is rendered more manageable. In the large way the distillation is sometimes performed from an iron pot connected by an earthen head and tube with a range of receivers, the fire being directly applied, and then the concentrated sulphuric acid is poured directly on the muriate of soda to lessen the action on the iron. But the acid prepared in this way, even when the precaution is followed, of coating the inner surface of the pot, is always contaminated with this metal. The yellow colour which the acid usually has, is not always, however, owing to the presence of iron, but is derived sometimes from a little extractive matter adhering to the sea salt, and it is to consume this that the salt is ordered, in the Edinburgh Pharmacopœia, to be exposed to a red heat. The yellow colour may be removed, by

distilling the acid a second time from a little muriate of soda. To the test of the strength of the acid from its specific gravity, the London College have added, that a fluid ounce of it, diluted with water, ought to dissolve, of a pure limestone, half an ounce.

The theory of the process is sufficiently simple. In all cases, where two acids act on one base, this base would be shared between them, in proportions determined by their affinities to it, and their relative quantities. But circumstances may prevent this participation, and cause one of the acids alone to combine with the base, as, for example, the application of a certain temperature, when one of the acids is much more disposed than the other, to assume the elastic form. This happens in the present case. The sulphuric acid exerts an affinity to the soda of the muriate of soda; this weakens the affinity exerted by the soda to the muriatic acid; its tendency to assume the elastic form prevails, and a portion of it is disengaged, and by the application of heat, aided by the quantity of sulphuric acid employed, the decomposition is rendered complete,—or the sulphuric acid combines with the soda, and the muriatic is disengaged; it is condensed partly by the water which rises with it in vapour, and partly by the water placed in the receivers.

Muriatic acid exists when uncombined in the elastic form, and is incapable of condensation by any cold or pressure hither to applied to it. But it is rapidly and largely absorbed by water; the water, at a common temperature, and under a mean pressure, condensing 360 times its volume. When of the strength stated in the Pharmacopœias, the specific gravity of 1.170, it is supposed to contain 22 of real acid, and 78 of water; it emits pungent vapours of muriatic acid gas on exposure to the air, reddens deeply the vegetable colours, tastes extremely sour, erodes even immediately vegetable and animal substances, and exerts considerable chemical agencies. The acid, however, not yielding oxygen readily, can oxidate inflammable and metallic substances, only by enabling

them, by a resulting affinity, to attract oxygen from the water with which it is combined. The decomposition of this acid has been hitherto only imperfectly effected. Galvanism can scarcely be brought to act on it in the elastic form; and in the liquid state the water only is decomposed. By heating potassium in the gas, rendered as dry as possible, hydrogen is evolved, and in such quantity as to prove that the acid gas retains a very large quantity of water combined with it; and more lately, Mr. Davy has discovered, that when the acid is obtained in combinations, free, or nearly so, from this water, its acidity is suspended, but is immediately restored on the addition of water;—facts which, in the present state of chemical theory, admit of no satisfactory explanation.

Muriatic acid is applied to no medicinal purpose. It has a place in the Pharmacopœias, merely as being employed in various pharmaceutic processes.

Acidum muriaticum dilutum. Diluted Muriatic Acid. Ph. Dub.

"Take of Muriatic Acid, Distilled Water, each one pound. Mix them."

This is a formula wholly superfluous, as muriatic acid is not employed medicinally, and requires therefore no adjustment to render its exhibition convenient; and for any pharmaceutic process, it is easy to order its dilution to the requisite extent.

Acidum oxymuriaticum. Oxymuriatic Acid.

When muriatic acid is distilled from substances capable of affording oxygen easily, it is converted into a species of elastic fluid altogether different in its chemical properties, which is considered as a compound of muriatic acid with oxygen, and is therefore named Oxymuriatic Acid. This has been applied to some medicinal purposes, and a process for preparing it has been introduced into the Dublin Pharmacopœia. The compound salt which is formed when this acid is presented to potash, the Oxymuriate of Potash, has also received

a place in the Materia Medica; and the process may be conducted so that it also shall be obtained. The preparations in which the oxymuriatic acid is formed, in the process given by the Dublin College, have been named

AQUA OXYMURIATICA ET AQUA ALKALINA OXYMURIATICA.

"Take of Muriate of Soda dried, two pounds; Manganese in powder, one pound; Water, Sulphuric Acid, each two pounds. Mix the muriate of soda and the manganese; put them into a matrass, and add the water; then by a convenient apparatus add the sulphuric acid gradually, and at intervals; transmit the gas which is disengaged through a solution of four ounces of subcarbonate of potash, in twenty-nine ounces of water. Toward the end of the operation, apply a moderate heat to the matrass. The specific gravity of this liquid is to the specific gravity of distilled water as 1087 to 1000."

"The Oxymuriatic Water (or solution of oxymuriatic acid in water) is prepared by transmitting the superfluous gas of the above process, by a proper apparatus, through a pint of distilled water. The specific gravity of this liquor is to that of distilled water as 1003 to 1000."

When muriate of soda, black oxide of manganese, and sulphuric acid are mingled together, the sulphuric acid combining with the soda disengages the muriatic acid; and the acid, receiving oxygen from the oxide of manganese, is converted into oxymuriatic acid, which assumes the elastic form. If the sulphuric acid is concentrated, its action is rather too rapid, and gives rise to a disengagement of gas not easily regulated; and if any part of the elastic product is forced from the apparatus, it is extremely disagreeable to the operator, from its highly suffocating odour. It is proper therefore to use the acid diluted somewhat, and after the commencement of the operation, to favour its progress by the application of a moderate heat. The proportions of the ingredients recommended by Vauquelin, are four parts of

muriate of soda, one of oxide of manganese, three of sulphuric acid, and two of water. When the combination of the gas, either with water, or with an alkaline solution, is to be effected, it is proper to use the bottles of Woolfe, so as to transmit the gas through the liquid, the first bottle being left empty to collect a little common muriatic acid that distils over, holding oxide of manganese dissolved.

Oxymuriatic acid has been employed to neutralize the agency of contagion, and change the noxious constitution of foul or corrupted air. To Guyton we are indebted for this application of it. It has been successfully applied in fumigating the wards of hospitals, the apartments of a prison, or other situations in which the atmosphere is contaminated by noxious effluvia, and probably is in this respect the most powerful agent we have it in our power to employ. By its chemical agency, it changes the constitution of the greater number of the compound gases, and more particularly of those having carbon and hydrogen as their elements. Noxious effluvia, derived from the decomposition of vegetable and animal matter, which are the usual sources of a corrupted or contagious atmosphere, may be presumed to be of similar constitution, and therefore to be liable to similar decomposition; and accordingly it has been ascertained, that air highly tainted has its purity, so far as is connected with the removal of such effluvia, restored by the diffusion of the vapours of oxymuriatic acid. The usual materials are mingled together, the sulphuric acid being used in its concentrated state, and are distributed in different vessels placed in the apartment designed to be fumigated. The only disadvantage attending the use of it is, that from its suffocating odour, the atmosphere in which it is diffused cannot be breathed; and in some situations, as in hospitals, where the sick cannot be removed, this renders it necessary to substitute the nitrous acid vapour. But where this does not limit its use, the oxymuriatic acid, as more active, is to be preferred. In its pure state, the oxymuriatic acid is not applied to

any other medicinal use, and there is therefore scarcely any necessity for the solution of it in water, which has received a place in the Dublin Pharmacopœia.

The salt obtained by transmitting the oxymuriatic acid gas through a solution of potash, and named the Oxymuriate of Potash, it has already been remarked, has been received into the Materia Medica, and has been employed as an antisyphilitic remedy. This salt is not strictly an oxymuriate, but the compound of an acid containing still more oxygen than the oxymuriatic acid, what has been named the Hyper-oxymuriatic Acid. When the oxymuriatic acid gas is introduced into the alkaline solution sufficiently concentrated, it undergoes a singular decomposition: one portion of it returns to the state of muriatic acid, and combines with part of the alkaline base; the other portion, receiving the oxygen which this had parted with, passes to the state of an acid, having of course a still larger proportion of oxygen in its composition than the oxymuriatic acid, and this combines with another portion of the alkali. The former salt, the muriate of potash, being abundantly soluble, remains dissolved; the other, being more sparingly soluble, is deposited in crystalline plates. These form the salt properly named Hyper-oxymuriate of Potash, (Hyper-oxymurias Potassæ.)

These combinations are much influenced by the concentration of the alkaline solution. If it is much diluted, the oxymuriatic acid is absorbed by it, and remains united with the water and the alkali without decomposition; as is evident from the liquor retaining the property of destroying the vegetable colours,—a property belonging to the oxymuriatic acid, but not to the hyper-oxymuriate of potash. It is only when the more powerful action of the alkali on the acid is favoured by concentration, that the decomposition takes place; and Berthollet has supposed, even, that it is much determined by the operation of crystallization itself. The alkaline solution, therefore, into which the oxymuriatic acid gas is transmitted, ought to be of such a strength,

that the hyper-oxymuriate will be formed in it, and crystallize spontaneously. The solution ordered by the Dublin College appears to be too weak, and the liquor obtained by their process probably contains much of the oxymuriatic acid undecomposed. A solution of the proper strength is obtained by dissolving sixteen ounces of sub-carbonate of potash in four pounds of water; and as the disengagement of the carbonic acid, by the action of the oxymuriatic acid, is troublesome, it is better to remove it by previous agitation of the solution with eight ounces of lime. From this solution, when the transmission of the oxymuriatic acid gas is continued for a sufficient length of time, the hyper-oxymuriate crystallizes spontaneously, and the quantity of crystallized salt ought not to be increased by any evaporation of the liquor, as a portion of muriate of potash might crystallize along with it. The crystals are therefore removed, washed with a little cold water, and dried. And when the salt is to be medicinally used, it ought always to be under this crystallized form. The solution ordered in the Dublin Pharmacopœia must be an uncertain preparation.

Hyper-oxymuriate of potash crystallizes in thin quadrangular tables, white, with considerable lustre. Its taste is cool and penetrating. It dissolves in seventeen parts of cold water, and in five of boiling water; is fused by heat; and by a higher heat is decomposed, giving out very pure oxygen gas. From the facility with which it parts with oxygen, it acts with much force on inflammable bodies, producing, by mere trituration with them, or percussion, violent deflagrations or detonations.

Its medicinal applications have been already pointed out. When nitric acid was introduced as a remedy in syphilis, the theory which suggested its use led likewise to the employment of hyper-oxymuriate of potash. It was given in a dose of ten grains thrice a day; and from the cases then brought forward, appeared to be superior even to nitric acid in suspending the symptoms of syphilis. It was not however ultimately established in

practice, and as no great advantage appears to be derived from it as an auxiliary to mercury, it is now seldom prescribed.

Acidum nitrosum. Nitrous Acid. *Ph. Ed. Dub.*

"Take of Nitrate of Potash bruised, two pounds; Sulphuric Acid, sixteen ounces. The nitrate of potash being put into a glass retort, pour upon it the sulphuric acid, and distil from a sand-bath with a fire gradually raised, until the iron pot is at an obscure red heat. The specific gravity of this acid is to that of distilled water as 1550 to 1000." The directions in the Dublin Pharmacopœia are nearly the same.

In this process the sulphuric acid combines with the potash, and disengages the nitric acid. The latter acid, however, principally from the agency of the heat, especially towards the end of the distillation when it is necessary to raise it pretty high, suffers a partial decomposition; a small portion of it loses a part of its oxygen, and a quantity of nitric oxide gas is formed; this is absorbed by the nitric acid, and forms the nitrous acid, which is of a yellow or red colour, and fuming, more or less so, according as it is more largely impregnated with nitric oxide, and, according, therefore, to the degree of heat employed in the distillation. The residuum is sulphate of potash, with an excess of sulphuric acid, this excess of acid being necessary to render the decomposition of the nitre complete. The specific gravity of the acid is probably stated too high; the coloured, or what is strictly named Nitrous Acid, being not easily procured of a greater specific gravity than 1.52. It sometimes contains a minute quantity of sulphuric acid and muriatic acid; the first is detected by adding muriate of barytes to the acid diluted with two parts of distilled water, sulphate of barytes being formed; the other is detected by nitrate of silver, muriate of silver being precipitated. When not intentionally added, however, these acids are never present in sufficient quantity to render it unfit for medicinal or pharmaceutical use.

Nitrous acid is extensively employed as a pharmaceutic agent: from the facility with which it parts with oxygen, it is one of the most important, particularly in oxidating and dissolving the metals. Its powers as a tonic and antisyphilitic remedy have been already considered; and indeed, when internally administered, it is necessarily given in the state of nitric acid, being brought to this state by dilution with water. In the state of vapour, it has been employed under the form of fumigation to destroy contagion; the due proportion of nitre and sulphuric acid being mingled together in small earthen cups, which are put in warm sand, and placed in the apartment designed to be fumigated, and though inferior to oxymuriatic acid in power, it has the advantage that it can be applied without requiring the removal of the sick.

ACIDUM NITROSUM DILUTUM. Diluted Nitrous Acid.

"Take of Nitrous Acid, Water, equal weights. Mix them, avoiding the noxious vapours."

In combining nitrous acid with water, the greater part of the nitric oxide gas, if it is highly charged with it, is disengaged with effervescence; if less is present, it is retained and converted into nitric acid by the oxygen held loosely dissolved by the water. The diluted acid is employed in a number of the chemical processes of the Pharmacopœia, and is convenient, in particular, for the solution of metals, being of that strength at which its action upon them is not too rapid.

ACIDUM NITRICUM. Nitric Acid. Ph. Ed.

"Take of Nitrous Acid, any quantity. Put it into a retort, and a receiver being adapted, apply a very gentle heat until the reddest part shall have passed over, and the acid which remains in the retort shall have become nitric acid." The heat is best applied by the medium of a water-bath.

Another process has been given in the London Pharmacopœia for the preparation of nitric acid.

"Take of Nitrate of Potash dried, Sulphuric Acid, each two pounds. Mix them in a glass retort; then distil the nitric acid with the heat of a sand-bath, until red vapours are produced. Lastly, having poured the distilled acid on an ounce of dried nitrate of potash, distil it again in a similar manner. The specific gravity of nitric acid is to that of distilled water as 1500 to 1000. If a piece of limestone be put into a fluid ounce of it diluted with water, seven drachms ought to be dissolved."

The process given in the Edinburgh Pharmacopœia is that which has been usually followed by chemists to convert nitrous into nitric acid. The nitrous acid is merely the nitric holding dissolved a portion of nitric oxide: when heat is applied, the nitric oxide being more disposed than the acid to assume the elastic form, the affinity by which it is retained in combination with it is weakened, and it is disengaged: this affinity, however, so far continues to operate, that it carries a portion of the acid along with it, and it escapes therefore in the state of very deep coloured nitrous acid vapour. The process is thus so far attended with loss, but this is easily obviated by condensing the nitrous acid vapour, by a portion of water put in the receiver, the diluted acid which will thus be obtained being easily applied to use. The heat ought to be applied by a water-bath, this being sufficiently high to expel the nitric oxide gas, and being not too high to produce decomposition of the acid.

It is difficult, however, by this method, to render the acid perfectly colourless, the last portion of nitric oxide, communicating a pale straw colour, being retained by such an affinity, and the volatility of the acid in this state approaching so nearly to that of nitric acid, that the whole may be distilled without the oxide being entirely separated. A more perfect process to obtain perfectly colourless nitric acid, is to distil it from a little black oxide of manganese, which yields oxygen to the nitric oxide.

In the process of the London Pharmacopœia, from the large quantity of sulphuric acid employed to decompose the nitre, the acid is obtained by the first distillation nearly in the state of nitric. The operation of this excess of sulphuric acid, in preventing the partial decomposition which would form nitrous acid, probably depends on two circumstances: one, that from the quantity adding to the force of its affinity, less heat is required to promote the decomposition of the nitre, and the greater part of the nitric acid is thus brought over before it is necessary, in continuing the distillation, to raise the temperature so high as to evolve nitric oxide; the other, that the water of this excess of acid will be volatilized, in the progress of the distillation, and contribute to preserve the constitution of the nitric acid. The influence of the latter circumstance is very well shown by the fact, that the product, instead of being superior in specific gravity to nitrous acid, as concentrated nitric acid is, is inferior, being, as stated in a report made to the College on the products of this process from different proportions of the materials, 1.50, while the nitrous is stated as having been obtained at 1.53. The weight too of the former, from a given quantity of nitre, amounted to four, that of the latter only to three. The relative value of the two is expressed by the quantity of marble they dissolve, that of the nitrous being stated at twenty-one, that of the nitric twenty-nine, expressing probably, (for they are not stated in a very distinct manner), not the relative strengths of equal weights of the two, but the relative strengths of the entire products, from a given weight of nitre. It thus will follow, that though a larger quantity of acid is obtained from the materials, by the mode of conducting the process in the London Pharmacopœia, the acid itself is not in its concentrated state.

Nitric acid is applied to the same purposes as nitrous acid. Medicinally, they must be the same, as the nitrous, by the dilution necessary for its administration, is converted into the nitric. And in their chemical agencies, and therefore in their pharmaceutic applications, they are precisely alike.

ACIDUM SULPHURICUM DILUTUM. Diluted Sulphuric Acid. *Ph. Ed. Lond. Dub.*

"Take of Sulphuric Acid, one part; Water, seven parts. Mix them." The same proportions are given in the Dublin Pharmacopœia. The London College have, without any necessity, altered the proportions both from those of the other Pharmacopœias, and from those which had formerly been ordered in their own Pharmacopœia: they order a fluid ounce and a half of sulphuric acid to be mixed with fourteen fluid ounces and a half of distilled water, giving the proportion by weight of one part of acid, to nearly five and a half of water. The reason given for this change is, that "the mixture will be more conveniently made, and its dose more easily apportioned, than that of the former Pharmacopœia." The absurdity of this is obvious. A mixture of sulphuric acid with water is made just as easily in one proportion as in another, and the dose of the diluted acid, whatever may be its strength, is apportioned with equal facility. Nor is it of any importance to have any relation between the dose of the diluted acid and any particular quantity of the concentrated acid, as the acid in the latter state has never been prescribed internally. It is to be regretted, that the strength of a preparation, to which practitioners have long been accustomed, has been thus unnecessarily changed.

The preparation of Sulphuric Acid being carried on on a large scale, for the purposes of commerce, no process is given for it in any of the Pharmacopœias, nor could it be executed in the shops. It is formed by burning sulphur mixed with from one-eighth to one-tenth of nitrate of potash, in large leaden chambers. By the oxygen afforded by the nitre, the sulphur is enabled to burn slowly, though the chamber be closed so as to admit of a very imperfect circulation of air; and the acid formed is principally the sulphuric, while from the combustion of sulphur in atmospheric air alone, sulphurous acid chiefly is produced. The acid vapours are absorbed by water placed in the bottom of the chamber. This liquor,

when sufficiently acidulated, is concentrated by evaporation, and afterwards by boiling it in glass retorts, and an acid is obtained thick and oily in its appearance, colourless and transparent, having a specific gravity of 1850. Formerly this acid was procured from the decomposition of sulphate of iron, the green vitriol of commerce, by heat; and hence the origin of the name, Vitriolic Acid, by which it has been known.

Sulphuric acid prepared in this manner is never perfectly pure. It contains a quantity of sulphate of potash, (the acid combining with a portion of the potash of the nitre,) and sometimes a small portion of sulphate of lead, derived from the action of the acid on the lead of the chamber. From these it is in a great measure purified by dilution with water, the diluted acid being incapable of holding them dissolved, and hence one advantage of the dilution. The dose of the diluted is also more manageable than that of the concentrated acid. As an astringent it is taken to the extent of from fifteen to thirty drops, usually in a cupful of water.

Acidum sulphuricum aromaticum. Aromatic Sulphuric Acid.

"Take of Alkohol, two pounds; Sulphuric Acid, six ounces. Drop the acid gradually into the alkohol. Digest the mixture with a very gentle heat in a close vessel for three days, then add of Bark of Cinnamon bruised, one ounce and a half; of Ginger bruised, one ounce. Digest again in a close vessel for six days; then strain through paper placed in a glass funnel."

The dilution of the acid by the alkohol is in the proportions in which they are mixed in this preparation, such, that little chemical action appears to be exerted during the digestion; an odour somewhat peculiar is acquired, but the acidity is little impaired. The aromatics render it more pleasant, and the preparation may be considered therefore as a grateful one for the exhibition of sulphuric acid. Its dose is thirty drops, given in a cupful of water. It is not unfrequently used in dyspepsia,

hæmoptysis, and other diseases in which this acid is employed.

ÆTHER SULPHURICUS. Sulphuric Ether.

"Take of Sulphuric Acid, Alkohol, of each thirty-two ounces. Pour the alkohol into a glass retort, capable of bearing a sudden heat. Then pour on the acid in an uninterrupted stream. Mix them gradually by frequent and gentle agitation; then immediately distil from a sand-bath, previously heated for this purpose, into a receiver kept cool with water or snow. Let the heat be regulated in such a manner that the liquor may be made to boil as soon as possible, and continue to boil until sixteen ounces have distilled over; then remove the retort from the sand. To the distilled liquor add two drachms of potash; then distil again from a high-necked retort, with a very gentle heat, into a receiver kept cool, until ten ounces have passed over. If to the acid remaining in the retort after the first distillation, sixteen ounces of alkohol be added, and the distillation be repeated, ether will again be produced. And this may be often repeated."

The directions in the other Pharmacopœias, for conducting this process, are nearly the same. In the London Pharmacopœia, the acid is ordered to be added gradually to the spirit, agitating the mixture after each addition; but on account of the rise of temperature as the mixture proceeds, this mode is more difficult than that directed by the Edinburgh College, of mixing the whole acid and alkohol at once, and any loss of ethereal vapour from the sudden action produced by the mixture is very trivial. The direction given by the Dublin College, to heat the spirit to 120°, before adding the acid, must render the making the mixture more difficult, and endanger the breaking of the retort from the addition of the dense cold acid.

On mixing equal weights of sulphuric acid and alkohol, a mutual action, marked by an elevation of temperature, and a hissing noise is produced, and a vapour is

disengaged, of a pleasant ethereal smell. On raising the temperature by the application of heat, so as to cause the mixed liquor to boil, ether is formed, and distils over. This continues for a considerable time: towards the end of this stage of the process, the liquid in the retort is capable of sustaining a higher temperature, and along with the ether, there is produced a white vapour, which condenses in streaks having an oily appearance, in the neck of the retort, and this increasing, collects in the form of a dense oily-like fluid, named Oil of Wine, or Ethereal Oil, which falls to the bottom of the receiver. If the heat be continued beyond this, there is a sudden and copious production of sulphurous acid gas, which, not escaping easily from the heavy liquor in the retort, causes it to swell up, and if not removed from the fire, it will pass over into the receiver. The principal nicety, therefore, in conducting the process, is to continue the distillation, so as to obtain the largest produce of ether, without bringing over the liquor from the retort. The rule given in the Edinburgh Pharmacopœia is to continue it, until the liquid condensed in the receiver is equal to half the quantity of alkohol that had been employed; as when this has been obtained, the formation of ether will have nearly ceased. The London College direct the distillation to be continued until the ethereal oil is produced; and if care be taken to guard against the sudden swelling up of the liquor in the retort, this may be done, and rather a larger product obtained. Whenever the neck of the retort becomes obscured with white vapours, the fire should be withdrawn; and if the materials begin to swell, the retort ought to be raised in the sand. The receiver requires to be kept cool by immersion in water, or causing water to trickle over it, in order to promote the condensation of the ether; and care ought to be taken to avoid approaching a burning body to the apparatus as accidents have sometimes happened, when the vessels were not closely luted, from the volatility and inflammability of the ethereal vapour.

There is considerable difficulty in establishing the theory of the formation of ether. As the process proceeds, the liquor in the retort assumes a dark colour, and a quantity of carbonaceous matter, somewhat bituminous, is diffused through it; it is likewise found to be considerably diluted with water, and another portion of water distils over with the ether. These changes, and the formation of the ether, must be referred to changes in the composition of the alkohol; and they were generally supposed to be owing to a portion of oxygen from the acid, being communicated to the hydrogen of the alkohol, and forming water; the balance of affinities being thus broken, part of the carbonaceous matter of the alkohol is likewise separated, and its remaining hydrogen and carbon, with any portion of oxygen it may contain, entering into combination, form the ether. To this theory however, it was some years ago objected by Fourcroy and Vauquelin, that the decomposition of the sulphuric acid is not essential to the formation of ether: it may take place to a certain extent towards the end of the process, when the temperature is high, and the liquor is loaded with carbonaceous matter; but there are no indications of it, they affirm, in the earlier stage, during which principally ether is formed: there is no evolution of sulphurous acid, and if the process be stopt at this stage, it is affirmed by these chemists, that the whole acid is to be found undecomposed, the residual liquid being capable of saturating as much of an alkaline base, as the quantity of sulphuric acid employed would do. They gave, therefore, a different view of the agency of the acid. Instead of communicating oxygen, they suppose it to operate by a disposing, or what would now be named a resulting affinity, causing part of the oxygen and hydrogen of the alkohol to combine and form water; then the equilibrium of affinities being subverted, carbonaceous matter is precipitated from the alkohol, and the new affinities being exerted, ether is the product of the combination of its remaining elements. The subject, however, notwithstanding the researches of

these chemists, is obscure. The fact, with regard to the acid not being decomposed, is not altogether certain; for the non-appearance of sulphurous acid, from which it has been inferred, may be owing to the small quantity evolved combining with the ether; and the power of the liquid to saturate as much of an alkaline base, as the sulphuric acid used in the process could do, may, if any portion of the acid be decomposed, be owing to the formation, by a partial oxygenation of the elements of the alkohol, of acetic or oxalic acid, both of which have been said to exist in the residual liquor. The facts, that those acids form ethers most readily from alkohol, which yield oxygen most readily, and that those which cannot communicate it directly form it with difficulty, and only by arrangements by which oxygen is communicated from some other substance, favour the supposition, that a communication of oxygen from the acid is necessary to the commencement at least of the series of changes.

It is sufficiently proved, however, that the decomposition of the acid is not necessary to any great extent, for the residual liquor is still capable of converting a fresh portion of alkohol into ether, and as this is economical, it is ordered in the Pharmacopœias. And its power of doing so appears to diminish progressively, not so much from exhaustion of the acid, as from its becoming too much diluted with water. This water may have either entirely pre-existed in the alkohol; or only partially, and have been in part formed by combination of portions of oxygen and hydrogen; and we have no certain mode of determining which of these is the case. The carbonaceous matter which is precipitated, is obviously derived from the alkohol; and its separation led to the conclusion, that less of this matter must exist in the composition of ether than in that of alkohol; that hydrogen, therefore, predominates in the composition of the former, and to this its greater volatility and levity were ascribed. Both alkohol and ether in burning afford water and carbonic acid, and from the comparative quantities afforded

in the combustion of each, Cruickshank inferred that the proportion of carbon to hydrogen is in ether as 5 to 1 nearly, while in alkohol it is as 8 or 9 to 1. The younger Saussure has more lately endeavoured, from the products of their detonation with oxygen, to discover their composition, and ether, he supposes, to contain more carbon and hydrogen than alkohol, but less oxygen. He states its composition at 59 carbon, 22 hydrogen, and 19 oxygen.

Ether obtained by the first distillation is not pure. It is diluted with a considerable proportion of water, sometimes also it contains alkohol, and very generally a portion of sulphurous acid, which had been evolved towards the end of the distillation. To free it from these is the object of the directions for its rectification inserted in the formula of the Pharmacopœia,—the sixteen ounces of liquid first procured being distilled from two drachms of potash, from a high necked retort, with a very gentle heat, until ten ounces are obtained; the potash detaining the sulphurous acid by the affinity it exerts to it, and rendering the water also less volatile. The same directions are given in the other Pharmacopœia, a portion of water only being ordered to be added to the potash and ether in the London Pharmacopœia, which may be useful by attracting the alkohol more effectually. If the ether of the first distillation be much impregnated with sulphurous acid, from the distillation having been continued longer than usual, it will be useful in the process of rectification to add a little black oxide of manganese, which yielding oxygen to the sulphurous acid, converts it into sulphuric, and abstracts it more effectually than is done by the alkali alone. In the London and Dublin Pharmacopœias, both the Unrectified and Rectified Ether have a place, the Ether, as obtained by the first distillation, being named Æther Sulphuricus in the London Pharmacopœia, and Liquor Æthereus Sulphuricus in the Dublin; and when rectified, Æther Rectificatus in the former, Æther Sulphuricus in the latter. The Edinburgh College, with more propriety, admit of

no distinction, but name the product when rectified, Sulphuric Ether, and sanction its use only in this state.

Sulphuric Ether in a state of purity has a peculiar odour, strong and diffusive, but not pungent; it taste is warm and penetrating; it is colourless and transparent; its specific gravity is 0.732, and when highly rectified is brought so low as .716; it is therefore one of the lightest known liquids. It is also one of the most volatile; it evaporates rapidly at common temperatures; it boils strongly in vacuo, even below 32, and under the atmospheric pressure at 98°. In evaporating it absorbs much caloric; hence, if dropt on the hand it quickly disappears, producing on the spot a sensation of cold; and this affords a very good test of its purity, the volatility being greater, as it is more highly rectified. It is soluble in alkohol in every proportion; in water only in the limited proportion of one part to ten; and this affords another test of its proper preparation, as if more soluble it is diluted either with water or alkohol.

Its medicinal properties have been already considered. It is employed principally as an antispasmodic, being given in a dose from half a drachm to a drachm. And it is sometimes applied externally as a stimulant, or, from the cold attending its evaporation, as a remedy to burns.

ÆTHER SULPHURICUS CUM ALKOHOLE. Sulphuric Ether with Alkohol. (Spiritus Ætheris Sulphurici, *Ph. Lond.*)

"Take of Sulphuric Ether, one part; Alkohol, two parts. Mix them together."

A process had formerly a place in the Pharmacopœias, in which sulphuric acid and alkohol were submitted to distillation, more alkohol being employed than the acid could convert into ether. A portion of it, therefore, distilled over unchanged on the first application of the heat, and served merely to dilute the ether that followed. For this preparation which had been received into practice under the name of the Sweet Spirit of Vitriol, the present has been substituted, but it has no peculiar advantage, and is seldom prescribed.

ÆTHER SULPHURICUS CUM ALKOHOLE AROMATICUS. Aromatic Sulphuric Ether with Alkohol. (Spiritus Ætheris Aromaticus, *Ph. Lond.*)

"This is made from the same aromatics, and in the same manner as the Compound Tincture of Cinnamon, unless that in place of Diluted Alkohol, Sulphuric Ether with alkohol is employed."

The addition of these aromatics to the sulphuric Ether in this formula is of so little importance, that the preparation is scarcely ever used.

To the preceding preparations, the London and Dublin Colleges have added another,—the peculiar oily-like fluid which is produced in the latter stage of the process for forming Ether, the Oil of Wine, as it used to be named.

OLEUM ÆTHEREUM. Æthereal Oil. Ph. Lond.

"The liquor remaining after the distillation of sulphuric ether, distil with a very gentle heat, until a black froth swells up; then immediately remove the retort from the fire. To the liquor which remains in the retort, add water, so that the oily part may float upon it. Draw this off, and mix with it lime water, as much as may be sufficient to neutralize the acid mixed with it. Lastly, withdraw the etherial oil after it has separated."

A different process is given by the Dublin College to obtain a similar product, which they name

LIQUOR ÆTHEREUS OLEOSUS. Oily Ethereal Liquor.

"Take the liquor remaining in the retort after the distillation of sulphuric ether. Distil it with a moderate heat to one half."

The product obtained by these processes is probably the same, being formed in the first process, but not distilled over; in the second, being obtained insulated by distillation, though to conduct this is attended with considerable difficulty, from the re-action of the carbonaceous matter, which has been separated from the alkohol, on the sulphuric acid. The nature of this oily substance

has not been well determined. It has been considered as a compound of ether and sulphurous acid, but no proof is given that by the combination of these it can be formed. Fourcroy and Vauquelin have supposed, that it is analogous to ether, differing from it in containing a larger proportion of carbon. It can be formed more directly by distilling ether from sulphuric acid. It is thick, unctuous in appearance, less volatile than ether, and soluble both in it and in alkohol. It is applied directly to no medicinal use, but is employed in forming the following preparation:

Spiritus ætheris compositus. Compound Spirit of Ether. Ph. Lond.

"Take of Spirit of Sulphuric Ether, a pint; Ethereal Oil, two fluid drachms. Mix them."

A composition had been in use under the name of Hoffman's Anodyne Liquor, which consisted of alkohol, with a portion of ether and ethereal oil. This, after having been discarded from the Pharmacopœias, has been restored in the present preparation, on the supposition that it possesses superior powers as an anodyne. It probably differs, however, in nothing from ether with alkohol, at least there is no distinct proof of any peculiarity of operation being communicated by the ethereal oil.

Æther nitrosus. Nitrous Ether. Ph. Dub.

"Take of Nitrate of Potash, dried and in coarse powder, one pound and a half; Sulphuric Acid, one pound; Rectified Spirit, nineteen ounces by measure. Put the nitrate of potash into a tubulated retort, placed in a bath of cold water; and add to it gradually, and in small quantities, the sulphuric acid and alkohol, previously mixed and allowed to become cold. Without the aid of any external heat, or with only such a slight degree of it as may be communicated by the addition of a little tepid water to the bath, an ethereal liquor will begin to distil. In a short time, the heat of the retort will increase spontaneously, and a considerable ebullition will take place,

which must be moderated by adding a portion of cold water to the bath. The receiver ought also to be kept cold with water or snow, and it ought to be furnished with an apparatus adapted to transmit through a pound of rectified spirit, in a phial kept cold, the highly elastic vapour disengaged suddenly, and with great force, from the mixture, when the heat is raised rather too high. The ethereal liquor thus obtained by spontaneous distillation is to be put into a phial closely stopt with a glass stopper; and to neutralize the excess of acid, as much sub-carbonate of potash in dry powder is to be added as is necessary, closing the phial after each addition, and determining the neutralization by the test of litmus. This is generally attained on the addition of about a drachm of the salt, and in a short time the nitrous ether rises to the surface, and may be withdrawn by a funnel. To obtain the ether in its purest state, distil it from a water-bath, heated to about 140 degrees, to one half. Its specific gravity is to that of distilled water as 900 to 1000."

The process for preparing nitrous ether has always been found extremely difficult, from the great susceptibility of decomposition of the acid, and the rapidity with which it communicates oxygen to the alkohol. Their mutual action, in consequence of this, becomes extremely violent, and it is difficult to add the requisite proportion of nitric acid to convert it into ether, or to do so at least without considerable waste in the dissipation of elastic products. Different arrangements have been contrived to facilitate this, but probably none that can be conducted more easily than that now received into the Dublin Pharmacopœia, originally contrived by Woolfe, and found by Pelletier to succeed better than any other. The addition of the mixture of sulphuric acid and alkohol should be made in small quantities at a time, not exceeding two ounces, and the quantity of product is increased by keeping the first receiver perfectly cool, and connecting with it not merely one bottle, but a range of bottles, containing, according to a

method employed by Thenard, a saturated solution of muriate of soda kept cold by ice, through which the elastic product is transmitted; it is condensed, and the liquid floats on the surface.

The theory of the formation of nitric ether remains obscure; the series of changes, however, are obviously altogether different from those which take place in the production of sulphuric ether. The acid is entirely decomposed, or nearly so, scarcely any trace of it having been found by Pelletier in either the distilled or the residual liquor; there is no precipitation of carbonaceous matter from the alkohol, the liquor remaining transparent, and of a light yellow colour; it contains oxalic and acetic acids, much diluted with water. Thenard, in his researches on this subject, found, that the elastic fluid disengaged during the process, consists of nitrogen, nitric and nitrous oxide, and carbonic acid gases, holding dissolved ether, and a portion of acid partly nitrous, partly acetic. The nitric ether, which is condensed, has also combined with it nitric and acetic acids; and when these are abstracted, so that it has no sensible acidity, it acquires this merely on keeping, a proof that the elements of these acids exist in its composition. From the products obtained from its decomposition by transmitting it through an ignited tube, he infers, that 100 parts of it consist of 16.41 of nitrogen, 39.27 of carbon, 34.73 of oxygen, and 9.59 of hydrogen. In its formation, much of the oxygen of the acid appears to combine with the hydrogen of the alkohol, forming water; a portion of it unites with part of the carbon, forming carbonic acid, and with portions of both producing acetic acid; a considerable part of the nitrogen of the acid is disengaged in its insulated state, or in the form of nitric and nitrous oxides, and the remaining oxygen and nitrogen combine with the remaining carbon and hydrogen, and form the nitric ether.

Nitric ether is light and volatile; its colour is usually yellow, probably, however, from the presence of a portion of free nitric acid surcharged with nitric oxide; its

odour is strong and penetrating, though not so fragrant as that of sulphuric ether; when pure and concentrated its volatility is such, that it instantly evaporates when poured from a phial, and boils at 70° under the common atmospheric pressure; it is highly inflammable: with alkohol it combines in every proportion, but in water it is soluble only in limited quantity, requiring, according to Thenard, when pure, 50 parts for its solution.

This ether has scarcely in its pure form been applied to any medicinal use; though it not improbably is possessed of powers analogous to those of sulphuric ether. Diluted with alkohol with a portion of free acid, it forms the following preparation, which has long had a place in the Pharmacopœias, and is used as a refrigerant and diuretic.

Spiritus ætheris nitrosi. Spirit of Nitrous Ether. (Spiritus Ætheris Nitrici, *Ph. Lond.*—Spiritus Æthereus Nitrosus, *Ph. Dub.*)

"Take of Alkohol, three pounds; Nitrous Acid, one pound. Pour the alkohol into a large phial placed in a vessel full of cold water, and add the acid gradually, agitating them frequently. Close the phial lightly, and set it aside for seven days in a cool place; then distil the liquor with the heat of boiling water into a receiver kept cold with water or snow, as long as any spirit comes over." In the Pharmacopœia of the London College, a smaller proportion of acid is added, three ounces only to two pints of rectified spirit, and twenty-six ounces are distilled off immediately by a gentle heat.

A preparation of this kind has long been employed in medicine. It consists probably of nitric ether diluted with alkohol, and containing always a portion of free acid. It is not difficult to add the nitric acid to the alkohol in the proportion of one to three parts, at least from this quantity of acid added with precaution, no violent action results. If heat were applied to this mixture, however, so as to raise it to 212°, a mutual decomposition,

attended with the rapid extrication of elastic products would take place. The heat must therefore be either applied more slowly, or the method ordered by the Edinburgh College must be followed, that of allowing the mixture to stand for some days in a cool place. During this time, a mutual action is exerted between the acid and alkohol; the former is partially decomposed, and the heat required for distillation can be safely applied. That this decomposition takes place is proved by the experiments of Bayen. He digested an ounce of nitrous acid with two ounces of alkohol for five weeks; the liquor then required for its saturation only 134 grains of an alkaline base, while an ounce of the same acid required to saturate it 282 grains of the same base. And when, after digesting the acid and alkohol together, he submitted them to distillation, on mingling the product and the residual liquor, the whole was capable of neutralizing only 32 grains. By this reciprocal action of the acid and alkohol, a portion of nitric ether appears to be formed; this nitric ether distils over with a considerable portion of unchanged alkohol, and a quantity of free acid. The theory of its production, therefore, so far as relates to the formation of the nitric ether, is the same with that which has been already explained. The propriety of the change which has been made by the London College, in this process, that of diminishing so much the proportion of nitric acid, may be questioned, both as less nitric ether must be formed when the proportion of acid is so small, and as a considerable share of the medicinal efficacy of the preparation probably depends on the free acid.

Spirit of nitric ether has an odour extremely fragrant; its taste is pungent and acidulous; it is volatile and inflammable, soluble readily both in alkohol and in water. It is employed principally as a grateful refrigerant in inflammatory affections, as a diuretic in dropsy, or rather as an auxiliary to promote the operation of more powerful diuretics, and as a stimulant relieving nausea and flatulence. Its dose is 30 or 40 drops taken in a cupful of water.

The Dublin College give a formula for the preparation of a spirit of nitrous ether, which must afford a product considerably different from that obtained by the preceding processes, particularly in containing no free acid. The directions are to "add to what remains after the distillation of nitrous ether the rectified spirit of wine which had been employed in the process to condense the elastic vapour, and distil with the highest heat of a water-bath to dryness. Mix this distilled liquid with the alkaline solution remaining after the separation of the nitrous ether, and add also as much dry sub-carbonate of potash as shall be sufficient to neutralize the free acid, ascertaining this by the test of litmus. Lastly, distil this with the mean heat of a water-bath while any liquid comes over. The specific gravity of the distilled spirit is to that of distilled water as 880 to 1000."

By this process, the portion of nitric ether in the residuum of the first distillation is obtained, and the alkohol which had been in part also impregnated with it, is farther changed by the free nitric acid of the residual liquor. The product, therefore, is somewhat analogous to that obtained by the preceding processes. But by the action of the alkali, to which it is afterwards submitted, its acidity must be removed, and to a certain extent this must modify its medicinal powers. The product of the process which has been longest in use, that of the Edinburgh Pharmacopœia, and the powers of which are sufficiently ascertained, is probably that which ought to be preferred.

CARBONAS POTASSÆ. Carbonate of Potash. Ph. Ed. (Sub-Carbonas Potassæ, *Ph. Lond.*—Sub-Carbonas Kali, *Ph. Dub.*)

"Let impure Carbonate of Potash be put into a crucible, and exposed to a red heat, that the oily impurities, if any are present, may be burnt out; then having rubbed it with an equal weight of water, mix them thoroughly by agitation. The liquor, after the impurities have subsided, being poured into a clean iron pot, is to be boil-

ed to dryness, stirring the salt constantly towards the end of the boiling, that it may not adhere to the vessel." The directions given in the other Pharmacopœias are essentially the same, except that in the London Pharmacopœia the liquor is not ordered to be evaporated to dryness, but until it become thick; it is then removed from the fire, and stirred with an iron rod, until it concrete into crystalline grains.

The Potash of commerce is obtained by the incineration of the wood of land vegetables; the ashes being lixiviated with water, so as to dissolve the saline matter, and this being evaporated to dryness. The dry mass consists principally of sub-carbonate of potash, with smaller quantities of sulphate and muriate of potash, siliceous earth, and metallic matter, principally oxides of manganese and iron. These are in a great measure abstracted by the present process, the sub-carbonate of potash from its greater solubility being dissolved, while the others, and especially the earthy and metallic matter, from the small quantity of water employed, remain undissolved. It is obtained at least sufficiently pure for medicinal or pharmaceutical use.

This saline matter is in the state of sub-carbonate, and is therefore improperly named in the Edinburgh Pharmacopœia. It is deliquescent, acrid, changes the vegetable colours to a green, and has the general alkaline properties. It consists, according to Kirwan, of about sixty of potash, thirty of carbonic acid, and six of water, with a few grains of sulphate of potash, siliceous and argillaceous earth. It is rarely applied to any medicinal use, but is employed principally as an agent in Pharmacy. A solution of it is inserted in the Dublin Pharmacopœia, under the name of AQUA SUB-CARBONATIS KALI, obtained by exposing the sub-carbonate in a funnel, in the tube of which is a piece of linen, to a humid atmosphere; the solution formed by the water, slowly imbibed from the atmosphere, being received in a vessel beneath. A similar solution, LIQUOR POTASSÆ SUB-CARBONATIS, is obtained, according to a formula

in the London Pharmacopœia, by dissolving a pound of sub-carbonate of potash in twelve ounces of water.

CARBONAS POTASSÆ PURISSIMUS, *olim*, *Sal Tartari*. Pure Carbonate of Potash, *formerly Salt of Tartar*. (Kali e Tartaro, *Ph. Dub.*)

" Take of impure Super-tartrate of Potash, any quantity. Having wrapped it up in moist bibulous paper, or put it into a crucible, burn it into a black mass, by placing it among live coals. Having reduced it to powder, subject it to a moderate heat, in an open crucible, until it become white, or at least of an ash-gray colour, care being taken that it do not melt. Then dissolve it in warm water; strain the liquor through linen, and evaporate it in a clean iron vessel, stirring the matter constantly towards the end of the evaporation, with an iron spoon, that it may not adhere to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, until the bottom of the vessel is nearly at a red heat. When cold, it is to be kept in glass vessels, well stopped." The same directions nearly are given in the Dublin Pharmacopœia, and this salt has also a place in the London Pharmacopœia.

By exposing the super-tartrate of potash to heat, the tartaric acid is decomposed. Part of its carbon and oxygen unite, and form carbonic acid, which is attracted by the potash; and, by continuing the heat, the remaining carbonaceous matter is burnt out. The super-tartrate of potash of commerce usually contains a little tartrate of lime, which, by the heat is converted into carbonate of lime, but by dissolving the saline matter in water, this, and any other earthy substances are separated, and, by evaporation, a salt is obtained, which, like the former, is a sub-carbonate of potash, but more pure. It appears also to contain rather a larger proportion of carbonic acid. The process, however, being more expensive than the preceding one, it is not often to be found in the shops.

CARBONAS POTASSÆ. Carbonate of Potash. Ph. Lond.

"Take of Sub-Carbonate of Potash, prepared from Tartar, a pound; Carbonate of Ammonia, three ounces; Distilled Water, a pint. Add to the potash dissolved in the water, the carbonate of ammonia; then, by a sand-bath, apply a heat of 180 degrees for three hours, or until the ammonia is expelled, and put the liquor aside that crystals may form. Let the residual liquor be reduced by evaporation, in a similar manner, so that when set aside it may again afford crystals."

The intention of this process is to obtain potash fully saturated with carbonic acid, or in the state of the neutral carbonate, the carbonic acid required for this being abstracted from the ammonia, and the ammonia itself being expelled. The same object is obtained with equal certainty and facility, by transmitting a current of carbonic acid gas through a solution of one part of sub-carbonate of potash, in three of water; and the crystallized salt is obtained probably more pure, as in the former method it is difficult to expel the ammonia entirely. The carbonate crystallizes in quadrangular prisms, which are not deliquescent: they are soluble in four parts of cold water. The taste of this salt is mild, but somewhat alkaline, and it changes the vegetable colours to a green. It is therefore disposed to crystallize with an excess of base, and is, in strictness of chemical language, a sub-carbonate. According to Pelletier, it consists of 40 of potash, 43 of carbonic acid, and 17 of water. It has been proposed to be used in medicine as a diuretic and antacid, in preference to the sub-carbonate, as being milder; and it answers better for preparing the effervescing draught.

AQUA SUPER-CARBONATIS POTASSÆ. Water of Super-Carbonate of Potash.

"Take of Water, ten pounds; Pure Carbonate of Potash, one ounce; Dissolve, and expose the solution to the current of Carbonic Acid Gas, which arises from

three ounces of Powder of Carbonate of Lime, three ounces of Sulphuric Acid, and three pounds of Water, gradually and cautiously mixed. The chemical apparatus invented by Dr. Nooth is well adapted to this preparation. But, if a larger quantity of the solution is required, the apparatus of Woolfe is preferable. The colder the air is, and the greater the pressure, the better will be the liquor. It ought to be kept in vessels well stopt."

Potash, when used as a lithontriptic, excites so much irritation in the stomach and bladder, that its use cannot well be long continued. But, when super-saturated with carbonic acid, as it is in this preparation, it is rendered more pleasant and less irritating; and, though its lithontriptic or real solvent power is diminished, or perhaps entirely lost, it is capable of acting as a palliative, and of being continued for any length of time; and from the observations already made under the class of lithontriptics, it follows, that no greater advantage is to be expected from the use of alkaline remedies under any form. It is taken to the extent of one, or even two pounds in the day. It affords also a grateful antacid. A solution of this kind has been in use for a considerable time; and to establish uniformity in its strength, it is properly inserted by the Edinburgh College as an officinal preparation. When properly prepared, it is pungent and acidulous, and sparkles when poured into a glass. By employing an apparatus, in which strong mechanical pressure can be applied, the solution may be still more impregnated with carbonic acid: it is thus rendered more grateful, and as an antacid, in particular, is perhaps rendered more effectual, the stimulus of the carbonic acid relieving the uneasy sensations connected with acidity of the stomach, while the alkali neutralizes the acid itself.

AQUA POTASSÆ, *vulgo Lixivium Causticum.* Water of Potash.

"Take of newly prepared Lime, eight ounces; Carbonate of Potash, six ounces. Put the lime into an iron

or earthen vessel, with twenty-eight ounces of warm water. The ebullition being finished, immediately add the salt; and the whole being well mixed, close the vessel until they become cold. Let the cold materials, previously well agitated, be poured into a glass funnel, the tube of which is obstructed with clean linen. Cover the upper orifice of the funnel, while the neck of it is inserted in another glass vessel, that the water of potash may gradually drop through the linen into the lower vessel. When it first ceases to drop, pour into the funnel a few ounces of water, but cautiously, so that it may swim above the matter. The water of potash will again begin to drop. In this manner the affusion of water is to be repeated, until three pounds have filtered, which will be in the space of two or three days. The upper parts of the liquor are to be mixed with the lower by agitation, and it is to be kept in a vessel well stopt." The directions given in the London and Dublin Pharmacopœias are essentially the same. A test is added to judge of the proper preparation of the solution, that it should be colourless, and scarcely effervesce on the addition of an acid. If on this addition any effervescence should take place, the liquor is to be again digested with a little lime, and filtered in a similar manner.

This process affords a very good example of the action exerted on an acid by two bases having an attraction to it, and of the effect of quantity of matter in influencing the results of chemical affinity. To the carbonic acid combined with the potash, an attraction is exerted by the lime, and by this attraction part of the acid would be withdrawn. A portion of it, however, would still remain united with the potash; and the only mode of counteracting this, and of at least diminishing the quantity, is to increase the proportion of lime acting on the carbonate. From the insolubility of lime, this can scarcely be done in any other mode than that followed in the present process, in which, by the arrangement of putting the entire mixture, with a great excess of lime, into a funnel, the tube of which is nearly

obstructed, the alkaline solution must filtrate slowly through the mass of lime. The affinity of the lime to the carbonic acid is thus favoured, and the greater part of the acid is abstracted from the potash. Still, however, from the effect of quantity on the force with which affinity is exerted, a small quantity of acid is retained in combination with the potash, which cannot be abstracted by this process. But if the lime has been in a sufficiently active state, and the directions observed so that the filtration has been performed slowly, the quantity is very inconsiderable, as is apparent from scarcely any sensible effervescence being excited by the addition of an acid, and for any medicinal or pharmaceutical purpose to which the solution is applied may be neglected. The agency of the air must be excluded during the filtration, especially from the filtered liquid, to prevent absorption of carbonic acid; and for the same reason it must, after it is prepared, be kept in glass vessels well stopt. Its specific gravity is to that of distilled water as 1220 to 1000. The medicinal applications of the alkali under this form have been already considered.

Potassa, *olim Causticum Commune Acerrimum.* Potash. (Potassa Fusa, *Ph. Lond.*—Kali Causticum, *Ph. Dub.*)

"Take of Water of Potash, any quantity. Evaporate it in a covered clean iron vessel, until, when the ebullition is finished, the saline matter flow smoothly like oil, which will happen before the vessel is at a red heat. Then pour it on a clean iron plate; cut it into small masses before it hardens, and immediately put them into a phial well stopt."

By the dissipation of the water, the alkali is obtained in a solid form; it is usually run into moulds, so as to be formed into cylindrical pieces. Under this form it is used as a caustic; it quickly erodes animal matter, and, mixed with soap into a paste, is sometimes used to open an ulcer.

POTASSA CUM CALCE, *olim Causticum Commune Mitius.* Potash with Lime. (Potassa cum Calce, *Ph. Lond.*—Kali Causticum cum Calce, *Ph. Dub.*)

"Take of Water of Potash, any quantity. Evaporate it to one-third in a covered iron vessel; then mix with it as much newly slacked lime as may be sufficient to give it the consistence of a solid paste, which is to be kept in a stopt vessel."

As a caustic, this is milder than the former preparation, and it has the advantage of being less deliquescent, so that it can be more easily confined to the part to which it is applied. When mixed, however, with the requisite quantity of soap to form a paste, it is scarcely sufficiently active.

ACETIS POTASSÆ. Acetite of Potash. (Potassæ Acetas, *Ph. Lond.* Acetas Kali, *Ph. Dub.*)

"Take of Pure Carbonate of Potash, one pound. Boil it with a gentle heat in four or five times its weight of Distilled Acetous Acid, and add more acid at different times, until, on the watery part of the former portion being nearly dissipated by evaporation, the acid newly added excite no effervescence: this will happen when about twenty pounds of acid have been consumed. Afterwards evaporate to dryness slowly. Let the remaining impure salt be liquefied with a gentle heat, for a short time; then dissolved in water, and strained through paper. If the liquefaction has been properly done, the strained liquor will be limpid; if not, of a brown colour. Afterwards evaporate with a very gentle heat this liquor, in a shallow glass vessel, stirring the salt while it concretes, that it may more quickly be brought to dryness. Lastly, the acetite of potash ought to be kept in a glass vessel, well closed, that it may not liquefy by the action of the air."

In this process, the acetic acid of the distilled vinegar combines with the potash, disengaging the carbonic acid. The acetate of potash, obtained by the evaporation, is liable to be of a brownish colour, from the pre-

sence, probably, of a little extractive matter, derived from the vinegar. It is freed from this, either by boiling the solution with charcoal powder; or, as directed in the Pharmacopœia, by melting the salt; and, by the second solution and evaporation, it is obtained in the form of a white foliated mass; the foliated structure, which is very characteristic of this salt, arising from a species of crystallization it suffers.

Acetate of potash is extremely deliquescent, becoming humid in a very short time from exposure to the air. It does not require more than its weight of water for its solution, at the temperature of 60°: it was at one time celebrated as a diuretic, in a dose of one or two drachms; but it has now nearly fallen into disuse.

SULPHAS POTASSÆ, *olim Tartarum Vitriolatum.* Sulphate of Potash. (Potassæ Sulphas, *Ph. Lond.*—Sulphas Kali, *Ph. Dub.*)

"Take of Sulphuric Acid, diluted with six times its weight of Water, any quantity. Put it into a large glass vessel, and gradually drop into it, of Carbonate of Potash, dissolved in six times its weight of Water, as much as may be necessary to the perfect saturation of the acid. The effervescence being over, strain the liquor through paper; and, after due evaporation, put it aside, that crystals may form. Sulphate of Potash may also be conveniently made, by dissolving the residuum of the distillation of Nitrous Acid in Warm Water, and saturating it by adding Carbonate of Potash."

In the former of these processes, the sulphuric acid unites with the potash of the carbonate of potash, and expels the carbonic acid with effervescence, the sulphate of potash remaining in solution. The second process being more economical, is that which is always followed, and it is it which has a place in the other Pharmacopœias. The salt remaining after the distillation of nitrous acid is sulphate of potash, with a considerable excess of sulphuric acid: this excess of acid is neutralized by the potash of the carbonate of potash. The neutral salt forms only in small crystals, the figure of

which is a six-sided prism, acuminated by six planes: by slow evaporation they are obtained of a larger size. They require seventeen parts of cold water for their solution. The taste of the salt is bitter. Its powers are those of a cathartic, in the dose of half an ounce; but it is more usually given in smaller doses as an aperient, and, from its sparing solubility, is given usually in powder.

SULPHAS POTASSÆ CUM SULPHURE, *olim Sal Polychrestus.* Sulphate of Potash with Sulphur. Ph. Ed.

"Take of Nitrate of Potash in powder, Sublimed Sulphur, equal weights. Throw them well mixed together, in small quantities at a time, into a red-hot crucible. The deflagration being finished, let the salt cool, and keep it in a glass phial, well stopt."

The nitrate of potash being decomposed at a red heat, affords oxygen to the sulphur, in such proportions as to convert it principally into sulphuric, and partly into sulphurous acid. Both acids are attracted by the potash; and it appears even that from the rapidity of the deflagration, a portion of the sulphur escapes oxygenation, and remains united with a portion of the alkali. This is therefore a mingled product. In its medicinal qualities, it does not appear to differ from the sulphate of potash; and it is soon converted into it, by exposure to the air. Hence it is little used.

POTASSÆ SUPER-SULPHAS. Super-Sulphate of Potash. Ph. Lond.

"Take of the Salt which remains after the distillation of Nitric Acid, two pounds; Boiling Water, four pints. Mix them, so that the salt may be dissolved, and strain. Then boil the solution until a pellicle appear on its surface, and put it aside that crystals may form. The liquor being withdrawn, dry these on bibulous paper."

By solution in water, the free acid of the residual mass is in part removed, but the salt still crystallizes with an excess of acid. It is much more soluble than

the neutral sulphate, but it is not very apparent to what medicinal use it can be applied, with any peculiar advantage.

TARTRIS POTASSÆ, *olim Tartarum Solubile.* Tartrite of Potash. (Potassæ Tartras, *Ph. Lond.*—Tartaras Kali, *Ph. Dub.*)

"Take of Carbonate of Potash, one pound; Super-Tartrite of Potash, three pounds, or as much as may be necessary; Boiling Water, fifteen pounds. To the carbonate of potash dissolved in the water, add, by small quantities, the Super-Tartrite of Potash rubbed to a fine powder, as long as it excites effervescence, which generally ceases before three times the weight of the carbonate of potash have been thrown in. Then strain the liquor, when cold, through paper; and, after due evaporation, put it aside that crystals may form."

The excess of tartaric acid in the super-tartrate of potash, is in this process saturated by the potash of the carbonate of potash, and the proper neutral salt is formed. Though ordered to be crystallized in all the Pharmacopœias, the crystallization of it can scarcely be accomplished by hasty evaporation. In its preparation, therefore, the solution is usually evaporated to dryness, and it is kept in powder in the shops.

This salt has a bitter taste; it is very soluble in water, requiring only four parts of cold water for its solution; and from this greater solubility compared with that of the super-tartrate, it derived its name of Soluble Tartar. Even the weaker acids decompose it partially, and reduce it to the state of super-tartrate. As a purgative, it is given in the dose of one ounce.

SULPHURETUM POTASSÆ, *olim Hepar Sulphuris.* Sulphuret of Potash. (Potassæ Sulphuretum, *Ph. Lond.*—Sulphuretum Kali, *Ph. Dub.*)

"Take of Carbonate of Potash, Sublimed Sulphur, of each eight ounces. Having rubbed them together, put them into a large coated crucible; and a cover being adapted to it, apply the fire to it cautiously, until they

melt. The crucible, after it has cooled, being broken, remove the sulphuret, and preserve it in a phial well stopt." The formula in the Dublin Pharmacopœia is the same; but in the London Pharmacopœia the proportions are very different, one ounce of sulphur being heated in a covered crucible with five ounces of sub-carbonate of potash, until they unite: the advantage supposed to be derived from this large proportion of alkali, is, that the whole sulphur is rendered soluble in water.

During the fusion of the two substances, the sulphur and potash combine, and the carbonic acid is disengaged, only partially, however, and hence the combination is less perfect than when the sulphur is melted with the pure alkali. The compound is easily fusible, and is of a yellowish, green or brown colour, and inodorous, but becomes fœtid when moistened or dissolved in water from partial decomposition, and the production of a compound of sulphur and hydrogen. It has been proposed to be used as an antidote to some of the metallic poisons, from the supposition that the sulphur will combine with the metallic preparation, and render it inert. From a similar theory, it has been imagined that it might obviate the effects of mercury on the system when these are too violent: but it is very seldom had recourse to with either intention, and it is doubtful if much advantage would be derived from it. The dose in which it has been proposed to be given is from ten to twenty grains, three or four times a day. It is said, in some cases of cancer, to have increased the efficacy of cicuta as a palliative, in doses of five grains.

AQUA SULPHURETI KALI. Water of Sulphuret of Potash. Ph. Dub.

"Take of Sublimed Sulphur, half an ounce; of Water of Potash, nine ounces. Boil them together for ten minutes, and filter the liquor through paper. Keep it in phials closely stopt. The specific gravity of this liquor is to that of distilled water as 1120 to 1000."

The alkali in its pure form, and in this state of solu-

tion, acts readily on the sulphur and dissolves it, the liquor being of a dark yellow or red colour. It is not merely, however, a solution of sulphuret of potash in water; for whenever sulphur is combined with an alkaline base, it partially decomposes water, and in the state of solution, therefore, a new compound is formed. The nature of their re-action is somewhat complicated. A portion of the sulphur attracts a portion of the oxygen of the water, and the sulphuric acid thus formed is combined with a part of the alkaline base. The hydrogen of the decomposed water enters into union with the remaining sulphur, forming the compound with excess of sulphur, named Super-Sulphuretted Hydrogen, and this remains combined with the rest of the base, forming what some chemists have named a Hydroguretted Sulphuret,—what may be distinguished by the less harsh appellation of a Sulphuretted Hydro-sulphuret. The solution, as prepared by the above formula, is adapted to the same uses as the sulphuret of potash.

CARBONAS SODÆ. Carbonate of Soda. (Carbonas Sodæ, *Ph. Dub.*—Sub-Carbonas Sodæ, *Ph. Lond.*)

"Take of impure Carbonate of Soda, any quantity. Bruise it, and boil it in water until all the saline matter is dissolved. Strain the solution through paper, and evaporate it in an iron vessel, so that on cooling crystals shall form."

The barilla of commerce, from which this salt is ordered to be prepared, is the residual matter of the combustion of marine plants. It is a very impure carbonate of soda, containing large quantities of other saline and earthy matter, chiefly sulphate and muriate of soda, lime, magnesia, argil and silex, with charcoal. The subcarbonate of soda crystallizing readily, the solution on being evaporated affords it nearly pure in the crystals which first form. The residual liquor, containing more of the other salts, ought to be rejected, a direction properly given in the formula of the London Pharmacopœia. From three to five ounces of the crystallized salt are obtained from a pound of barilla.

This crystallized salt, though mild to the taste, is still sensibly alkaline, and it changes the vegetable colours to a green. It is therefore, in the strictness of chemical nomenclature, a sub-carbonate, as the London College have named it. It crystallizes in octohedrons; its crystals are efflorescent; they require not more than twice their weight of cold water for their solution; and by a heat inferior to that of 212° are liquified by the action of the very large quantity of water of crystallization they contain. Its quantity amounts to 64 parts in 100, with 21.6 of soda, and 14.4 of carbonic acid. The use of this salt as a lithontriptic has been already stated; and for its more convenient exhibition, it is ordered in the London and Dublin Pharmacopœias to be kept dried.

Sodæ sub-carbonas exsiccata. Dried Sub-carbonate of Soda, *Ph. Lond.*—(Carbonas Sodæ Siccatum, *Ph. Dub.*)

"Take of Sub-carbonate of Soda, a pound. Submit it to the heat of boiling water in a clean iron vessel until it is perfectly dry, stirring it constantly with an iron spathula. Then rub it into powder."

Carbonate of soda has been given as a lithontriptic, principally mixed with soap under the form of pill. If the crystallized salt be used, besides the addition to its bulk from the water of crystallization, it effloresces, so that the pill prepared from it soon loses its cohesion. The dried carbonate is therefore preferable; and from the moderate heat to which it is exposed in the drying, the water merely is expelled.

Sodæ carbonas. Carbonate of Soda. Ph. Lond.

"Take of Sub-carbonate of Soda, a pound; Sub-carbonate of Ammonia, three ounces; Distilled Water, a pint. To the sub-carbonate of soda dissolved in the water, add the ammonia; then by a sand-bath apply a heat of 180° for three hours, or until the ammonia is expelled, and put it aside, that crystals may form. Let the remaining liquor be evaporated in a similar manner, and put aside, that crystals may again be produced."

The sub-carbonate of soda will in this process receive carbonic acid from the carbonate of ammonia, and be brought to the neutral state, while the ammonia will be expelled by the heat. The same neutralization might be effected more directly and economically, by transmitting a current of carbonic acid gas through the solution of the sub-carbonate. The salt in this state, however, does not appear to possess any particular advantage for medicinal or pharmaceutical use.

AQUA SUPER-CARBONATIS SODÆ. Water of Super-carbonate of Soda. Ph. Ed.

"This is to be prepared from ten pounds of Water, and two ounces of Carbonate of Soda, in the same manner as the Water of Super-carbonate of Potash."

The proportion of the carbonate to the water is greater in this preparation than in that of the super-carbonate of potash water; but this is owing to the carbonate of soda containing so much water of crystallization, that even with the enlarged proportion, there is not more real alkali in the one than in the other. The super-carbonated soda water is used as a lithontriptic in the same dose as the super-carbonated potash water, and is usually preferred, on the supposition of being more pure and mild.

TARTRIS POTASSÆ ET SODÆ, *olim Sal Rupellensis*. Tartrite of Potash and Soda. (Soda Tartarizata, *Ph. Lond.*—Tartaras Sodæ et Kali, *Ph. Dub.*)

"This is prepared from Carbonate of Soda and Super-Tartrate of Potash, in the same manner as Tartrate of Potash."

The excess of tartaric acid in the super-tartrate of potash, being saturated in this preparation by the soda of the carbonate of soda, a triple salt is formed, properly named by the Edinburgh College, Tartrate of Potash and Soda. It crystallizes in rhomboidal prisms; is soluble in five parts of water at 60°, and has a bitter saline taste. It consists, as Vauquelin has stated its composi-

tion, of 54 parts of tartrate of potash, and 46 of tartrate of soda. It is employed as a cathartic, in the dose of one ounce; and is often preferred, as being less disagreeable than the greater number of the saline cathartics.

PHOSPHAS SODÆ. Phosphate of Soda. (Phosph. Sodæ, *Ph. Dub.*)

"Take of Bones, burnt to whiteness, and reduced to powder, ten pounds; Sulphuric Acid, six pounds; Water, nine pounds. Mix the powder in an earthen vessel with the sulphuric acid; then add the water, and again mix them. Keep the vessel in the vapour arising from boiling water for three days; at the end of which, dilute the matter, by adding other nine pounds of Boiling Water, and strain through a strong linen cloth, pouring over it gradually, boiling water, until the whole acid is washed out. Put aside the strained liquor, that the impurities may subside, from which pour it off, and, by evaporation, reduce it to nine pounds. To this liquor, again poured off from the impurities, and heated in an earthen vessel, add Carbonate of Soda dissolved in warm water, until the effervescence cease. Then strain, and put it aside, that crystals may form. These being removed, add, if necessary to the liquor, a little Carbonate of Soda, that the phosphoric acid may be exactly saturated; and prepare it, by evaporation, again to form crystals, as long as these can be produced. Lastly, let the crystals be kept in a vessel well stopt."

The white residuum of burnt bones consists chiefly of phosphate of lime. The sulphuric acid partially decomposes it, by combining with the lime; the phosphoric acid which is disengaged, in conformity to the law of chemical attraction, that quantity of matter influences affinity, and that in all cases where two acids act on a base, there is a participation of this base between them, in proportions determined by their respective quantities and affinities, retains a quantity of lime combined with it, forming a soluble compound. When carbonate of soda is added to the acidulous liquor obtained by washing the materials, the soda combines

with the free phosphoric acid, and the lime retaining as much phosphoric acid in combination as forms neutral phosphate of lime, is precipitated; the phosphate of soda crystallizes on evaporation of the strained liquor. Its crystals are rhomboidal prisms, and are obtained of a regular figure only in crystallizing with a slight excess of alkali. Hence the liquor should be slightly alkaline; and from the tendency of the salt to crystallize with an excess of base, it is necessary, though the neutralization may have been perfect, to add, previous to the second crystallization, a little carbonate of soda. The crystals are efflorescent; they are soluble in little more than three parts of cold, and in half that quantity of boiling water. They consist, according to Thenard, of 19 of soda, 15 of acid, and 66 of water. The taste of this salt is purely saline, without any bitterness; its medicinal operation is that of a mild cathartic, and, from being less nauseous to the taste than the other salts, it is entitled to preference. Its dose is one ounce, given generally dissolved in six ounces of tepid water, or soup.

SULPHAS SODÆ, *olim Sal Glauberi.* Sulphate of Soda. (Sulphas Sodæ, *Ph. Lond. Dub.*)

"Dissolve the Acidulous Salt, which remains after the distillation of muriatic acid, in Water; and add to it, Carbonate of Lime in powder, to remove the superfluous acid. Put it aside until the impurities have subsided; then having poured off the liquor, and strained it through paper, reduce it by evaporation, that crystals may be formed." The London College order the excess of sulphuric acid to be neutralized by carbonate of soda, but it is more economical to use carbonate of lime. Slaked lime is preferable to either, as it decomposes a little muriate of iron, which adheres to the salt.

In the decomposition of muriate of soda by sulphuric acid, to prepare muriatic acid, more sulphuric acid is used than is necessary merely to saturate the soda, advantage being gained from its quantity adding to its affinity, as has been already explained; hence the ne-

cessity of removing the excess of acid in the residual mass, to obtain the neutral sulphate. This salt is also obtained as a residuum in some other processes, particularly in the preparation on a large scale of muriate of ammonia, the Sal Ammoniac of commerce. It crystallizes in hexhaedral prisms; they are efflorescent and soluble in rather less than three parts of cold water. They consist of 18.48 of soda, 23.52 of acid, and 58 of water. This salt has long been in use as a cathartic: it operates with sufficient power and certainty, but is liable to occasion nausea, from its very bitter taste. Its medium dose is an ounce and a half.

CARBONAS AMMONIÆ, *olim Ammonia Præparata.* Carbonate of Ammonia. (Carbonas Ammoniæ, *Ph. Lond. Dub.*)

"Take of Muriate of Ammonia, one pound; Carbonate of Lime, commonly called Chalk, dried, two pounds. Each being separately reduced to powder, mix them, and sublime from a retort into a receiver kept cold."

In this process the muriatic acid of the muriate of ammonia combines with the lime of the carbonate of lime, and the carbonic acid of the latter unites with the ammonia of the former; the exertion of these new affinities being determined by the heat applied. The carbonate of ammonia which is formed is sublimed, and is obtained in a crystalline cake. When the process is carried on in the large way, the sublimation is generally performed from an iron pot, to which the heat is directly applied, and which is connected with a large earthen or leaden receiver. The Dublin College, in place of carbonate of lime, direct carbonate of soda to be used; with this the application of so high a heat will not be required; but not being sufficiently economical, the direction will not be attended to by the practical chemist.

According to the experiments of Mr. Davy, carbonate of ammonia varies in the proportions of its ingredients according to the heat applied in its preparation;

they vary so much as from 20 to 50 parts of ammonia in 100, the ammonia being in larger proportion, as the temperature at which the carbonate has been formed is high; that formed at a temperature of 300° containing 50 parts of alkali, while that produced at a temperature of 60° contains only 20 parts. Still in all these proportions the product is a sub-carbonate; its smell is pungent and ammoniacal, and it changes the vegetable colours to a green: It is very volatile, abundantly soluble in water, and is efflorescent on exposure to the air. Its medicinal uses are as a stimulant applied to the nostrils in fainting, and as a stimulant and diaphoretic, taken internally, in a dose of from five to fifteen grains.

AQUA CARBONATIS AMMONIÆ, *olim Aqua Ammoniæ.* Water of Carbonate of Ammonia. (Aq. Carbonatis Ammoniæ, *Ph. Dub.*)

"Take of Muriate of Ammonia, Carbonate of Potash, of each sixteen ounces; Water, two pounds. To the salts, mixed and put into a glass retort, add the water; then distil from a sand-bath with a fire gradually raised, to dryness." The Dublin College give the same process with the substitution of Carbonate of Soda for carbonate of potash, by which probably a larger quantity of carbonic acid will be combined with the ammonia.

In this preparation of carbonate of ammonia by the humid way, carbonate of lime, from its insolubility, could not be employed to decompose the muriate of ammonia, as it is in the dry way; an alkaline carbonate is therefore employed. The alkali, whether potash or soda, attracts the muriatic acid, while the ammonia combines with the carbonic acid. The carbonate of ammonia is volatilized and dissolved by the watery vapour. The solution is applied to the same medicinal purposes as the concrete ammoniacal carbonate, and is generally preferred for internal use.

A formula is given by the London College for a similar preparation, under the name of Liquor Carbonatis Ammoniæ, obtained by the solution of the solid carbonate in water. Eight ounces of the carbonate of ammo-

nia are dissolved in a pint of distilled water, and the solution is strained through paper.

LIQUOR VOLATILIS CORNU CERVI. Volatile Liquor of Hartshorn. Pharm. Dub.

"Take of Hartshorn, any quantity. Put it into a retort, and distil, with a heat gradually raised, a volatile liquor, salt, and oil. Distil the volatile liquor repeatedly until it become limpid as water, separating, after each distillation, the salt and oil by filtration. The liquor will be purified more easily, if, after each distillation except the first, there be added to it a sixth part of its weight of charcoal, previously made red hot, extinguished by being covered with sand, and reduced to powder while hot. If hartshorn cannot be procured in sufficient quantity, the bones of any land animal may be employed in its place."

This is a process which has long been employed in Pharmacy. The animal matter, principally the gelatin of the bones, at an elevated temperature suffers decomposition, and its principles enter into new combinations, forming chiefly carbonate of ammonia and empyreumatic oil. These are the products of the process; the carbonate of ammonia being partly dissolved by the water which distils over, and obtained partly in a concrete state. It is always contaminated, however, with the empyreumatic oil, which renders it nauseous; and though at one time it was supposed, from this impregnation, to be possessed of some peculiar virtues, this probably had no just foundation, and it is now rejected from practice. If sublimed from charcoal powder, the oily matter is completely removed; but then it differs in nothing from the carbonate of ammonia obtained by the preceding processes, and the process, with these repeated operations, is not more economical.

AQUA AMMONIÆ, *olim Aqua Ammoniæ Causticæ*. Water of Ammonia. (Liquor Ammoniæ, *Ph. Lond.*—Aqua Ammoniæ Causticæ, *Ph. Dub.*)

"Take of Muriate of Ammonia, one pound; Lime, recently prepared, a pound and a half; Distilled Water, one pound; Water, nine ounces. Pour the water upon the lime bruised in an iron or earthen vessel, closing the vessel until the lime, having fallen into powder, has become cold; then mix the muriate, rubbed to very fine powder, with the lime, rubbing them together in a mortar, and then put them into a retort of the coarser glass, (*bottle glass*). Let the retort be placed in a sand-bath, and connect with it properly the apparatus of Woolfe. In the first bottle, of smaller size than the others, furnished with a tube of safety, put two ounces of distilled water; and in the second vessel what remains of the distilled water. Then apply the fire, increasing gradually until the bottom of the iron pot is at a red heat, and as long as the ammonia is produced. Mix the liquor from both bottles, and let it be kept in small phials well stopt." The directions in the London Pharmacopœia for conducting this process are nearly the same, except that the lime, without being previously slaked, is reduced to powder, and mixed with the muriate of ammonia, and to this mixture put into a retort, a pint of water is added; the lime will then be slaked, but it must be with some risk of the retort breaking from the sudden heat, and the ammoniacal gas must also be very rapidly disengaged. In the formula given by the Dublin College, a large quantity of water is mingled with the materials in the retort, and a portion only of this is drawn off by distillation, impregnated with the whole of the ammonia.

In these processes, the lime combines with the muriatic acid of the muriate of ammonia, and the ammonia is disengaged. Being permanently elastic, it is condensed only by combination with the water, and this is effected either by distilling water at the same time from the materials, or by transmitting the ammoniacal gas through

water. The Edinburgh and London Colleges have preferred the latter mode, and they obtain a solution in this way, perhaps more strongly impregnated; the other mode is rather more easily conducted, and affords a product sufficiently strong for any medicinal or pharmaceutical purpose. On a large scale, an iron still is employed, into which the materials are put, and to which the fire can be directly applied; the head of the still being connected with a spiral tube placed in a refrigeratory, to the extremity of which, besides the recipient to collect the condensed product, two or three receivers are adapted, containing water to absorb any ammoniacal gas.

Water, under a common atmospheric pressure, and at a temperature below 50°, absorbs about one-third of its weight of gas; and by this combination its specific gravity is diminished, that of the saturated solution being not more than 9054. It is seldom so completely impregnated. By following the mode directed by the Dublin College, which is that usually followed, the solution is obtained of the specific gravity of 936; and when of this strength, it contains about 16 of ammonia in 100 parts. Its smell is strong and pungent; its taste extremely acrid, and it inflames the skin. Though its odour is pungent, it ought to be free from any fœtor. It is employed in medicine as a stimulant and diaphoretic, internally, in a dose from twenty to thirty drops, and sometimes as an emetic in a larger dose diluted with water. Externally it is used as a stimulant applied to the nostrils, and as a rubefacient.

ALKOHOL AMMONIATUM, *olim Spiritus Ammoniæ.* Ammoniated Alkohol. (Spiritus Ammoniæ, *Ph. Lond. Dub.*)

"Take of Alkohol, thirty-two ounces; recently Prepared Lime, twelve ounces; Muriate of Ammonia, eight ounces; Water, eight ounces. From these, prepare the Ammoniated Alkohol in the same manner as the water of ammonia, and preserve it in a similar manner.

This compound used formerly to be prepared by decomposing the muriate of ammonia by sub-carbonate of

potash, and this method is still retained in the Dublin Pharmacopœia. The result of it was, that as carbonate of ammonia is not soluble in alkohol, either the alkohol was impregnated with the portion of ammonia only disengaged by the operation of the excess of alkali in the sub-carbonate on the muriate of ammonia, or that the distillation was carried so far, as to bring over with the alkohol a quantity of water sufficient to dissolve the carbonate of ammonia which had been produced. The Edinburgh College having substituted lime, it disengages the ammonia from the muriate of ammonia altogether in its pure form, and the ammoniacal gas is condensed by the alkohol. The London College order it to be prepared merely by mixing two parts of rectified spirit, and one of water of ammonia; but in this way the alkohol is considerably diluted. Ammoniated alkohol has the pungent smell, and retains all the powers of ammonia. It is used principally as the menstruum of some vegetables with which ammonia coincides in medicinal operation.

ALKOHOL AMMONIATUM AROMATICUM, *olim Spiritus Ammoniæ Aromaticus*. Aromatic Ammoniated Alkohol. (Spiritus Ammoniæ Aromat. *Ph. Lond. Dub.*)

"Take of Ammoniated Alkohol, eight ounces; Volatile Oil of Rosemary, one drachm and a half; Volatile Oil of Lemon, one drachm. Mix them so as to dissolve the oils." In the London Pharmacopœia, oil of cloves is ordered in place of oil of rosemary; and in the Dublin, half an ounce of nutmeg, with two drachms of oil of lemons, are digested with two pounds of spirit of ammonia, and afterwards a pound and a half distilled off.

By this combination of ammonia with alkohol, and the addition of the aromatic oils, it is rendered more grateful than the water of ammonia. This preparation is therefore frequently used in preference to the other, as a stimulant in languor or faintness, or to relieve flatulence. Its dose is from fifteen to thirty drops.

ALKOHOL AMMONIATUM FOETIDUM, *olim Spiritus Ammoniæ Fœtidus.* Fœtid Ammoniated Alkohol. (Spiritus Ammoniæ Fœtidus, *Ph. Lond. Dub.*)

"Take of Ammoniated Alkohol, eight ounces; Assafœtida, half an ounce. Let them digest in a close vessel for twelve hours; then distil eight ounces by the heat of boiling water."

The impregnation of the ammoniated alkohol with part of the assafœtida in this process, though it may communicate a fœtid smell, can add little to its activity; and accordingly, though it has a place in all the Pharmacopœias, it is not found in the shops. It has been given in hysteria in a dose of thirty drops.

SPIRITUS AMMONIÆ SUCCINATUS. *Pharm. Lond.* Succinated Spirit of Ammonia.

"Take of Mastich, three drachms; Alkohol, nine fluid drachms; Oil of Lavender, fourteen minims; Oil of Amber, four minims; Water of Ammonia, ten fluid ounces. Macerate the mastich in the alkohol, so that it may be dissolved, and pour off the clear solution; add to this the other ingredients, and mix them all by agitation."

Spirit of ammonia, impregnated with oil of amber and some other essential oils, had been in use as a stimulating perfume under the name of Eau de Luce. A composition had been introduced into the London Pharmacopœia as a substitute for this, which had not, however, its usual milky appearance. This is given in the present formula by the addition of the mastich, the resinous matter of which is separated by the water, but retained in a state of suspension, probably by the action of the alkali.

AQUA ACETITIS AMMONIÆ, *vulgo Spiritus Mindereri.* Water of Acetate of Ammonia. (Liquor Ammoniæ Acetatis, *Ph. Lond.*— Aqua Acetatis Ammoniæ, *Ph. Dub.*)

"Take of Carbonate of Ammonia, any quantity. Pour upon it as much distilled acetous acid, as may be sufficient to saturate the ammonia exactly."

The acetic acid of the distilled vinegar combines with the ammonia of the carbonate of ammonia, disengaging the carbonic acid with effervescence; and the acetate of ammonia being a very soluble salt, remains dissolved in the water. As the distilled vinegar is not uniform in strength, the precise proportion necessary to be added cannot be assigned, but in general it will be about thirty parts to one. As much must always be added as to produce neutralization; and as the liquid is sometimes used as an external application in cases where the acrimony of the alkali would be hurtful, it is better that there should be even a slight excess of acid. From the variable quantity of acid in the vinegar, the preparation cannot be of uniform strength, and this cannot be obviated by crystallizing the salt, the heat decomposing it which would be necessary to evaporate the water. Were it of any importance, a uniformity of strength might be obtained by ordering the quantity prepared from a given weight of carbonate of ammonia to be reduced by slow evaporation to a certain measure; but this is not necessary, the solution having no great activity, and being given generally in divided doses. It is employed as a diaphoretic in febrile affections, an ounce of it being given, and repeated twice or thrice at intervals of an hour, and its operation promoted by mild diluents. Externally it is used as a discutient, and likewise as an application in some forms of inflammation.

HYDRO-SULPHURETUM AMMONIÆ. Hydro-Sulphuret of Ammonia. (Hydro-Sulphuretum Ammoniæ, *Ph. Dub.*)

"Take of Water of Ammonia, four ounces. Expose it in a chemical apparatus to the stream of gas which arises from Sulphuret of Iron, four ounces; Muriatic Acid, eight ounces, previously diluted with two pounds and a half of Water. The sulphuret of iron for this purpose is conveniently prepared from three parts of Purified Iron Filings, and one part of Sublimed Sulphur, mixed together, and exposed in a covered crucible to a moderate heat, until they unite."

The sulphuretted hydrogen is produced in this process by the muriatic acid enabling the iron to decompose part of the water by attracting its oxygen. The hydrogen disengaged combines with a portion of the sulphur, and forms sulphuretted hydrogen; and this elastic fluid being transmitted through the water of ammonia unites with it, and forms a liquid of a dark green colour, and a very fœtid odour.

The medicinal applications of hydro-sulphuret of ammonia have been already taken notice of. It depresses the action of the stomach and digestive organs, and has been used from this quality in bulimia and in diabetes, in a dose of from five to ten drops twice a day.

AQUA SULPHURETI AMMONIÆ. Water of Sulphuret of Ammonia. Ph. Dub.

"Take of recently Prepared Lime, Muriate of Ammonia in powder, each four ounces; of Sublimed Sulphur, Warm Water, each two ounces. On the lime in an earthen vessel, sprinkle the water, and cover the vessel until the lime fall to powder. This, when cold, mix by trituration with the sulphur and muriate of ammonia, avoiding the acrid vapour which arises. Put the mixture into a retort, and distil with a strong heat suddenly raised. Keep the liquor thus obtained in a phial closely stopped with a glass stopper."

This preparation is similar to one long known to chemists by the name of Fuming Liquor of Boyle, and which Berthollet considered as a hydro-sulphuret of ammonia much concentrated, with an excess of ammonia, to which he ascribed its fuming property. As muriatic acid, when added to it, causes not only a disengagement of sulphuretted hydrogen, but likewise a precipitation of sulphur, it is probably rather a sulphuretted hydro-sulphuret. It has not been applied to any medicinal use.

SULPHAS ALUMINÆ EXSICCATUS, *olim Alumen Ustum.* (Alumen Exsiccatum, *Ph. Lond.*—Alumen Ustum, *Ph. Dub.*)

"Let Alum be liquified in an earthen or iron vessel, and exposed to heat, until it cease to boil."

In this process, the alum loses merely its water of crystallization; it is deprived of its hardness, and resolved into a spongy mass, easily reducible to a fine powder; and both from this, and from being rendered more active, it is better adapted to the purposes of an escharotic, to which it is applied.

LIQUOR ALUMINIS COMPOSITUS. Compound Solution of Alum. Ph. Lond.

"Take of Alum, Sulphate of Zinc, each, half an ounce; Boiling Water, two pints. Dissolve the alum and the sulphate of zinc in water; then strain through paper."

This forms a strong astringent solution, which has been employed to check hæmorrhage or profuse mucous discharges; and when considerably diluted, has been used as a collyrium.

MURIAS BARYTÆ. Muriate of Barytes.

Take of Carbonate of Barytes, Muriatic Acid, each, one part; Water, three parts. To the water and acid mixed together, add the carbonate, bruised into small pieces. The effervescence being finished, digest for an hour, then strain, and after due evaporation put the liquor aside that crystals may form. Repeat the evaporation as long as there is any formation of crystals.

"If the carbonate of barytes cannot be procured, the muriate may be prepared from the sulphate, in the following manner:

"Take of Sulphate of Barytes, two pounds; Wood Charcoal in powder, four ounces. Calcine the sulphate, that it may be the more easily reduced to a fine powder, with which is to be mixed the powder of charcoal. Put this into a crucible, and having adapted a cover, urge it with a strong fire for six hours. The matter being well triturated, put it into six pounds of Boiling Water, in a closed glass or earthen vessel, and mix them by agitation, preventing, as much as possible, the access of the air. Let the vessel stand in a vapour bath, until the part

not dissolved has subsided; then pour off the liquor. Pour on the residuum four pounds of boiling water, which, after agitation and subsidence, add to the former liquor. While it is yet hot, or, if it has cooled, having again heated it, drop into it Muriatic Acid as long as effervescence is excited. Then strain it, and evaporate, that it may crystallize."

The first of these processes is the most easy of execution, the muriatic acid combining with the barytes, and disengaging the carbonic acid with effervescence; the muriate of barytes remaining dissolved, and by evaporation being obtained crystallized. But the native carbonate of barytes being not an abundant mineral production, is not always to be procured: the second process, therefore, is inserted, in which the sulphate, which is a more common fossil, is substituted. In this process, the carbonaceous matter with which it is heated attracts the oxygen of the sulphuric acid; the sulphur remains united with the barytes. This sulphuret of barytes is dissolved by the water, and freed from any undecomposed sulphate; but in dissolving, it is at the same time, like other sulphurets with an alkaline or earthy base, partially changed; a portion of its sulphur attracts oxygen from the water, reproducing sulphuric acid, with which a little barytes unites and is precipitated; the hydrogen of the decomposed water unites with another portion of sulphur, forming sulphuretted hydrogen, which enters into combination with the remaining sulphuret of barytes, and prevents its farther decomposition. When the muriatic acid is dropped in, it combines with the barytes, disengages the sulphuretted hydrogen, and precipitates the sulphur. The solution of muriate of barytes, on evaporation, affords the salt crystallized. This process, though a little complicated, is perhaps preferable to any other, as it must afford the barytic salt free from any metallic impregnation; for, if any metallic matter be mixed with the sulphate, being reduced by the charcoal, it will not be dissolved in any subsequent step of the process.

Solutio muriatis barytæ. Solution of Muriate of Barytes.

"Take of Muriate of Barytes, one part. Distilled Water, three parts. Dissolve."

The muriate of barytes was introduced by Dr. Crawford as a remedy in scrofulous affections, as has been already stated under the class of tonics, to which it belongs. This saturated solution is designed to afford a preparation of uniform strength,—a circumstance of importance, as from the activity of the medicine its dose requires to be regulated with some care. Five drops are given twice a day, and gradually increased to twenty or more.

Carbonas calcis præparatus, *olim Creta Præparata et Cancrorum Lapilli, vulgo Oculi Cancrorum Præparati.* Prepared Carbonate of Lime, formerly Prepared Chalk, and Prepared Crabs Stones, commonly called Crabs Eyes.

"Carbonate of Lime, whether the softer variety, commonly named Chalk, or the harder, called Crabs Stones and Crabs Eyes, after being rubbed to powder in an iron mortar, and levigated with a little water on a porphyry stone, is to be put into a large vessel. Water is to be poured upon it, and after the vessel has been frequently agitated, it is to be poured off, loaded with the fine powder. On the water remaining at rest, a subtile powder subsides, which is to be dried. The coarse powder which the water could not suspend, is to be again levigated, and treated in the same manner." The same directions nearly are given for the preparation of chalk, by the London College; the crabs claws and concretions they have rejected, retaining in place of them, as purer than the chalk, Prepared Shells, the process for obtaining which has been already given (page 10.) The directions given by the Dublin College for the preparation of chalk are also similar; and they have likewise admitted Prepared Oyster Shells, and Prepared Egg Shells, (Ovorum Testæ Præparatæ, Ostrearum Testæ Præparatæ,) these being prepared as chalk.

Chalk is a native carbonate of lime, seldom perfectly

pure, but containing often portions of argillaceous and siliceous earths. The crabs stones are concretions found in the stomach of the river craw-fish, (Cancer Astacus). They are collected when the animal is in a putrid state, are washed and dried. They have the advantage of being free from any gritty particles, and form therefore a smoother powder. They consist of carbonate and phosphate of lime, with a portion of gelatin; the proportion of carbonate being about seventy, of phosphate ten or twelve. The shells are of similar composition; but for all these, there is generally substituted in the shops merely chalk prepared with more care, and having a little gelatin diffused through it. They are used as antacids.

Potio carbonatis calcis, *olim Potio Cretacea.* Potion of Carbonate of Lime.

"Take of Prepared Carbonate of Lime, an ounce; Refined Sugar, half an ounce; Mucilage of Gum Arabic, two ounces. Rub them together, and then add gradually, Water, two pounds and a half; Spirit of Cinnamon, two ounces. Mix them."

This is similar to the chalk mixture of the other Pharmacopœias, already noticed, and is merely a convenient form for exhibiting carbonate of lime.

Creta præcipitata. Precipitated Chalk. Ph. Dub.

"Take of Solution of Muriate of Lime, any quantity. Add to it, of Carbonate of Soda, dissolved in four times its weight of warm distilled water, as much as may be sufficient to precipitate the chalk. Render the precipitate pure, by allowing it to subside three times, and washing it each time with a sufficient quantity of water. Then collect it, and dry it on a chalk stone or bibulous paper."

In this process, the muriate of lime is decomposed by double affinity, the muriatic acid being attracted by the soda, and the carbonic acid combining with the lime. It affords a pure carbonate of lime, but is scarcely of

sufficient importance to be received as an officinal preparation.

CALX. Lime. Ph. Lond.

"Take of Limestone, a pound. Bruise it into small pieces, and calcine these in a crucible with a very strong fire for an hour, or until the carbonic acid is entirely expelled, so that acetic acid, when added, shall not disengage any bubbles of air. In the same manner, lime may be prepared from shells, after these have been washed in hot water, and freed from their impurities."

There is little advantage in the introduction of this process; lime prepared on the large scale, for the numerous uses to which it is applied, being sufficiently pure for any medicinal purpose, especially as, when it is internally administered, it must always be given in solution; and in the state in which it is usually met with, it impregnates water just as strongly as lime in its purest state.

AQUA CALCIS. Lime Water. (Liquor Calcis, *Ph. Lond.*—Aqua Calcis, *Ph. Dub.*)

"Take of Lime recently prepared, half a pound: Put it into an earthen vessel, and sprinkle upon it, four ounces of water, keeping the vessel closed while the lime becomes hot, and falls into powder; then pour on it twelve pounds of water, and mix them by agitation. After the lime has subsided, repeat the agitation; and do so about ten times, keeping the vessel always shut, that the free access of the air may be prevented. Let the water be strained through paper, interposing between the filter and the funnel glass rods, that the water may pass through as quickly as possible. Let it be kept in bottles well stopt."

Lime is sparingly soluble in water; not more than $\frac{1}{600}$th being dissolved, at 60°. Yet, notwithstanding this small quantity, the water has a strong styptic taste, and changes the vegetable colours to a green. The caution to exclude the air in this process, arises from the sup-

position that the lime would combine rapidly with the carbonic acid of the atmosphere. After the solution is strained, it is at least necessary that it should be kept in vessels well stopt. Lime water is the form under which lime is always used internally. It is employed as a tonic, astringent, and antacid in dyspepsia, chronic diarrhœa, and leucorrhœa. Its dose is from one to two pounds daily.

AQUA CALCIS COMPOSITA. Compound Lime Water. *Ph. Dub.*

"Take of Guaiac Wood in shavings, half a pound; Liquorice Root cut and bruised, an ounce; Bark of Sassafras bruised, half an ounce; Coriander Seeds, three drachms; Lime Water, six pints. Macerate them without heat for two days, and strain."

The lime water can derive very little additional power from these ingredients, and they, on the other hand, must have their powers very imperfectly extracted. The preparation is one, therefore, which can have little activity.

SOLUTIO MURIATIS CALCIS. Solution of Muriate of Lime. (Aqua Muriatis Calcis, *Ph. Dub.*)

"Take of Pure Carbonate of Lime (namely, White Marble), in small pieces, nine ounces; Muriatic Acid, sixteen ounces; Water, eight ounces. Mix the acid with the water, and add gradually the pieces of carbonate of lime. The effervescence being finished, digest for an hour. Pour off the liquor, and reduce it by evaporation to dryness. Dissolve the residuum in its weight and a half of water, and strain."

The muriatic acid combines with the lime, and disengages the carbonic acid. To remove any superfluous acid, and obtain a solution of uniform strength, the solid salt is obtained by evaporation, and is then dissolved in a fixed proportion of water. The solution of muriate of lime has been recommended as a tonic, similar, and not inferior to the muriate of barytes. The dose is from fifteen to twenty grains of the dried salt, or thirty drops of the solution.

CARBONAS MAGNESIÆ, *olim Magnesia Alba.* Carbonate of Magnesia.

"Take of Sulphate of Magnesia, Carbonate of Potash, of each equal weights. Let them be dissolved separately in twice their weight of warm water, and either strained or otherwise freed from impurities. Then mix them, and immediately add eight times their weight of boiling water. Boil the liquor for a short time, stirring it, then allow it to remain at rest, until the heat be diminished a little, and strain it through linen, on which the carbonate of magnesia will remain. Wash it with pure water, until it be perfectly tasteless."

In this process there is a mutual decomposition of the salts, the sulphuric acid of the sulphate of magnesia combining with the potash of the carbonate of potash, and the carbonic acid uniting with the magnesia. The use of adding the boiling water, and boiling the liquor, is, partly to dissolve the sulphate of potash, which is a salt sparingly soluble, and partly to prevent a species of crystallization which the carbonate of magnesia would undergo, rendering it gritty, and thus give it a smoothness which it has not when this precaution is not observed. Carbonate of magnesia, however, is generally prepared on a large scale from the Bittern, or liquor remaining after the crystallization of muriate of soda from sea-water, which is principally a solution of muriate of magnesia. This is decomposed by carbonate of potash, or sometimes by an ammoniacal carbonate, and there are some niceties of manipulation requisite to give it the whiteness, lightness, and smoothness, which are valued as marks of its goodness. Hence it is superior in these qualities to what it would be were it prepared by the above process on a small scale.

Carbonate of magnesia, properly prepared, is nearly insipid; it is extremely light, white, and smooth to the touch; is insoluble in water. It consists of from 45 to 55 of magnesia, from 25 to 48 of carbonic acid, and from 15 to 30 of water. What appears to be the neutral carbonate, obtained in crystals by mixing the saline so-

lutions without applying heat, consists of 25 of magnesia, 50 of acid, and 25 of water. The common preparation is therefore a sub-carbonate. It is given as an antacid in a dose from a scruple to a drachm, and usually produces at the same time a laxative effect.

MAGNESIA, *olim Magnesia Usta.* Magnesia.

"Let Carbonate of Magnesia be exposed in a crucible to a red heat, for two hours. Then preserve it in glass phials well stopt."

By the heat thus applied, the carbonic acid of the carbonate, and a considerable portion of its water, are expelled, and the pure magnesia remains. It loses about half its weight. A smaller quantity, therefore, of the pure magnesia, will produce the same effect as a larger of the carbonate. It is preferred to the latter, both from this circumstance, and also, where, from the abundant acidity on the stomach, flatulence is occasioned by the disengagement of carbonic acid when the carbonate is employed.

CHAPTER XX.

METALLICA.—METALLIC PREPARATIONS.

METALS are distinguished by their opacity, brilliancy, and density. They are fusible and volatile at very different degrees of heat; and at various temperatures they combine with oxygen, forming oxides, and, in two or three cases, compounds possessed of acid properties.

The metals used in medicine are, Silver, Quicksilver, Copper, Iron, Lead, Tin, Zinc, Bismuth, Antimony, and Arsenic.

Metals in their pure state being insoluble in the animal fluids, can scarcely exert any action on the system. Tin, by a mechanical action, is supposed to have an

anthelmintic power: some of the others, as iron, copper, and lead, have been supposed to be capable of being acted on by the gastric fluids, so as to produce certain effects; but in general they must be combined with other agents to render their action powerful and certain; and it is their preparations only that are used in medicine.

The general changes which metals are made to undergo, to fit them for medicinal purposes, are, combining them with oxygen, and farther, combining the oxides thus formed with acids. In general, it is true, that the metal is more active as a medicine, the more highly it is oxidated, though to this there are some exceptions; and its activity is still farther increased by combination with an acid. In general also, where the metal is combined with an acid, it is more certain in its operation than where it is merely oxidated, as the activity of the oxide may be influenced by the state of the stomach with respect to acidity; and, besides, uniformity of composition is in general more easily attained in the saline compound than in the oxide alone, and its state of aggregation has usually, from its solubility, less influence on its action.

The metallic preparations form some of our most important remedies. They are those most liable to uncertainty in their operation, from variations in the processes to which they are subjected: they are at the same time those which, from their activity, it is necessary to have least variable in strength. The principles, therefore, which regulate their combinations, so far as these are connected with their pharmaceutic preparation, are highly important; and as this subject has not been much illustrated, and errors with regard to it are not unfrequent, I have thought it necessary to consider it at some length, before proceeding to the individual preparations.

The simplest form of combination in which metals are given, is combined with oxygen, or in the state of oxide. In this state they act with more or less power on

the living system. Their oxidation is generally effected by the action of atmospheric air, assisted by heat, sometimes by deflagration with nitre, and sometimes also by acids, the acid being afterwards abstracted by the action of a substance exerting an affinity to it.

The principal objection to this form of preparation is the uncertainty to which it is liable in the uniformity of its composition. Every metal, in exerting an affinity to oxygen, is capable of combining with that principle in different proportions; and its power of acting on the living system in common with all its qualities, is much influenced by the quantity with which it is combined.

Now, the degrees of oxidation of which a metal is susceptible are numerous, and, there is much reason to believe, are even indefinite, from the *minimum* to the *maximum*. The reverse of this opinion has indeed been maintained, and it has been supposed that metals are capable of undergoing only certain fixed degrees of oxidation. But the opposite conclusion appears to be more just. If we take, for example, black oxide of manganese, and expose it to heat, part of its oxygen is expelled; and this is more or less, according to the degree of heat applied: in this decomposition there are no fixed stages in the decomposition, where oxides of a certain uniformity of composition, or with a determinate proportion in oxygen, are obtained; but there is a series perfectly indefinite, from the perfect black oxide to that which approaches nearest to the metallic state. Six oxides of antimony have been described, and there is probably a greater number.

The only case in which oxides of uniform and determinate composition can be expected to be obtained, are where they are formed under circumstances which establish a perfect uniformity in the process. Thus, if a metal be oxidated by the atmospheric air, exactly at the point at which it melts, as that point is uniform, or always the same, the oxide will likewise be uniform; and for the same reason, if an oxide is formed at the vaporific point, it will be always of the same composition.

But where such a uniformity of external circumstances does not exist, the degree of oxidation may be variable, and, there is every reason, both from facts and from the laws of chemical affinity, to believe indefinite.

This consideration ought to establish a rule in Pharmacy, which has unquestionably been too much neglected. The opinion having been adopted, that the metals are susceptible only of few and determinate degrees of oxidation, the conclusion has been too hastily adopted, that even with considerable variations in the process, or by processes extremely dissimilar, the ultimate product will be the same. There is every reason to believe that this is incorrect; and hence, 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 importance, 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.

The other form of preparation under which metals are administered, is that in which the metallic oxide is combined with an acid. Compounds of this kind are generally more active than those in which the metal is merely oxidated. The acid perhaps imparts an additional activity, and the compound being generally more or less soluble, while the oxides are usually insoluble, the former must, from this cause, act more powerfully on the stomach, and be more readily received into the circulating mass.

These combinations are generally formed by subjecting the metal to the action of the acid. The acid first yields to it oxygen, either directly, by parting with a portion of what it contains, or by a resulting affinity, enabling it to attract oxygen from the water which may

be present, or from the atmospheric air. With the oxide formed in either of these modes, the acid then combines.

As a metal can exist in different degrees of oxidation, so it may enter into combination with acids with different proportions of oxygen, and, from this circumstance, very important differences in their medicinal powers are established. What preparations can differ more widely than the corrosive muriate, or corrosive sublimate, as it is named, of mercury, and the mild muriate or calomel? Yet the primary difference between them is in the degree of oxidation of the metal, the proportion of oxygen being less in the latter than in the former.

In general, when a metal is acted on by a weak acid, or one much diluted, it forms a compound, in which it is less oxidated than when it has been subjected to the action of a more powerful or concentrated acid. Or if heat has been employed to favour the mutual action, the metal passes to a higher state of oxidation than when it has been dissolved in the cold.

It even often happens, that after a metal has been oxidated and combined with an acid, it continues to attract oxygen, either from the acid, or from the atmospheric air,—a circumstance requiring to be attended to in Pharmacy, as giving rise to alterations in metallic preparations.

It has been stated, that a metal combines with oxygen in general, not in determinate proportions, but indefinitely. The question naturally occurs, therefore, does this also happen when they combine with acids, or do they enter into such combinations only in certain determinate degrees of oxidation? No question in Pharmacy can be more important; for, according as one or other of these happens, either uniformity of composition, or much uncertainty may be expected to be found in metallic preparations; and if the latter be the case, much more attention will be required, than might be supposed necessary, in establishing a strict uniformity in the processes by which these preparations are formed.

In general, it appears, that the acid, by the energy of the affinity it exerts, has a very powerful effect in rendering the degree of oxidation determinate, and that these combinations are, therefore, usually established with uniform proportions. We have an example of this in the two muriates of mercury. In each of these the metal is in a certain state of oxidation, and whatever process be followed, no intermediate combination appears to be formed. At the same time, it must be admitted, that the degree of oxidizement of the metallic oxide, in combining with the metal, appears also to be sometimes indefinite. Thus, in crystallizing a solution of iron in dilute sulphuric acid, the crystals which are first formed are of a pale green colour; those formed by a second or third evaporation are deeper, and there remains a liquid incapable of crystallizing. In all these there are different states of oxidation. In like manner, in the solution of mercury in nitric acid, the acid may exist in a number of different degrees of oxidation, according to the manner in which the solution has been performed, and these solutions will give rise to very different compounds in the decompositions and new combinations to which they may be subjected.

Another source of uncertainty in the composition of the metallic salts, is, that the metallic oxide can combine with various and apparently indefinite proportions of acid. We can have the compound with the acid and metallic oxide combined in those proportions which give rise to neutralization, but we can have it also with various degrees of excess of acid, or excess of base; and each of these will give a preparation different in power, and liable to be very differently affected by other chemical agents.

This is in particular often displayed in preparing metallic compounds by the medium of acids. From the uncertainty to which the oxidation of metals, by the application of heat, is liable, it has frequently been proposed to obtain the product in the humid way, the metal being dissolved in an acid, and this acid being abstracted after-

wards by a substance exerting an affinity to it, and the metal precipitated in its oxidated state. But in almost every case these precipitates are not pure oxides, as they have been supposed to be; they retain a portion of the acid with which the oxide was combined, and are therefore sub-salts. They are sometimes thrown down merely by water, and they then retain a considerable proportion of acid in combination; and even when subjected to the more powerful action of an alkali, the whole of the acid is not abstracted, the influence of quantity adding so much to the force of affinity, that a portion of it is retained by the oxide.

In these precipitations from the decomposition of metallic salts, the composition of the precipitate is frequently rendered still more complicated, from part of the precipitating substance entering into the combination.

The influence of the proportions in which a metallic oxide and acid may combine, is shown in another case, —that where, by applying heat, the acid may have its solvent power so far aided, and be from this cause so saturated with the oxide, as to be incapable of retaining the whole of it in solution when diluted. When water is added, therefore, to a solution of this kind, a partial decomposition ensues; part of the metallic oxide is precipitated, retaining a portion of acid united with it, forming a sub-salt, while the other portion remains dissolved with a slight excess of acid. Now, if such a solution is to be decomposed by adding a neutral salt with the acid of which the metallic oxide is designed to be combined, the mere water in which the salt is dissolved will at the same time act on the metallic solution, and throw down a quantity of this precipitate, which will mingle with the precipitate formed by the metallic oxide and the acid of the decomposing salt, and will of course modify its powers. Hence, a metallic solution is liable to afford, when decomposed, a very different product, both from the different states of oxidation in which it may hold the metal dissolved, and the different proportions of oxide with which the acid may be combined.

Metallic preparations, it is thus obvious, are liable to considerable uncertainty of composition; and this suggests the conclusion, that processes with regard to them, once established, ought not to be hastily altered, even in circumstances which may appear trivial. It is equally obvious how important it is, that for every active metallic preparation, the same process should be adopted in every country.

The nomenclature of the metallic saline preparations is attended with considerable difficulty, especially in discriminating between the different salts formed from the same acid, united with the same metal, but existing in different states of oxidation. This difference gives rise to very different medicinal properties, or at least very different degrees of activity, and renders it necessary, therefore, that the names ought to be so far distinct, that the one salt cannot be mistaken for the other. Now, the chemical nomenclature is, with regard to this case, defective, and it is difficult to render it more precise. The system of nomenclature requires that the name of each compound salt should be derived from the acid and the base of which it is composed, the acid affording the radical of the generic name, the base giving the specific appellation. But the names of the species of metallic salts have been derived, not from the metallic oxide which is strictly their base or the substance in direct combination with the acid, but from the metal itself. We thus speak of sulphate of iron, muriate of mercury, and others, when the salt is actually sulphate of oxide of iron, muriate of oxide of mercury, &c. Did the metal exist always in one state of oxidation as it is combined with the acid, this nomenclature would give rise to no inconvenience. But as it is often in different states of oxidation, the nomenclature is deficient, or something more is required to distinguish between the different salts which, from these different states of oxidation, may be formed from the same metal and the same acid.

In the cases which have been hitherto observed, in general, not more than two salts are formed from di-

versity of oxidation in the same metal combined with the same acid; and one method which has been employed to mark their distinction, is to apply the usual generic name to the salt formed from the metal in the low state of oxidation, and to prefix to the same generic name applied to the other salt, the syllable *oxy*, as denoting the higher degree of oxidation. Thus we have two muriates of mercury, one containing the metal at a low, the other at a high degree of oxidation, and these, according to this method, would be distinguished, the one by the name of Muriate, the other by that of Oxymuriate of Mercury. But, independent of the objection, that this violates the principles on which the nomenclature is constructed, since the one salt is just as much a muriate as the other; the syllable *oxy* is appropriated, in the language of Modern Chemistry, to a different purpose, that of denoting the compounds of an oxygenated acid; and Oxymuriate of Mercury, a name now sanctioned by the London College, expresses therefore, not a compound of muriatic acid, as the salt actually is, to which it has been improperly applied, but a compound of oxymuriatic acid, which it is not. Besides, as a medical nomenclature, the merely prefixing the syllable *oxy* to the same term is far from being sufficient to distinguish between salts totally different, and which it is in the highest degree dangerous to confound. Another method likewise employed, is to apply the generic term to the salt formed from the oxide at the maximum of oxidation, and to prefix to the same term applied to the salt at the minimum, the syllable *sub;* naming, for example, one of the salts of mercury now referred to, Muriate of Mercury, the other Sub-muriate of Mercury. This has been adopted by the Edinburgh College; but it is equally incorrect. The principles on which the modern nomenclature is founded, require that the epithet *sub* should be appropriated to the names of those salts in which there is a deficiency of acid or excess of base; the base, however, still being the same as that of the corresponding salt, to the name of which this epithet

is not prefixed. But in the metallic salts to which this mode has been applied, there is no deficiency of acid, and the base is not the same; the salt to which the epithet *sub* is applied may contain less acid than the other, but this is because the oxide, which is its base, requires less for its saturation: it is altogether a different species, and by the addition of acid, it cannot be converted into the other, which it would be, were it, as the name implies, a Sub-salt. This mode too is liable to the same objection as the other, the merely prefixing to the name common to both, the epithet *sub*, to distinguish one of them, not being sufficiently distinctive, where it is of so much importance that they should be distinguished. These two methods also are unfortunately opposed to each other, the usual generic name being applied according to the one mode to the one salt, while, according to the other, it is applied to the other; thus the term Muriate of Mercury, will, in the one, be employed to denote the salt with the metal in the highest state of oxidation, and in the other, it will be applied to the salt precisely the reverse,—a circumstance which renders the adoption of either method improper.

Any nomenclature founded on the supposition of specific degrees of oxidation being established, would be equally improper; for, even supposing them not to be indefinite, which, however, there is every reason to believe they are, the propriety of the appellation in any case would depend on the perfect accuracy of the analysis, and the discovery of a different degree of oxidation with regard to any metal would require the change of the nomenclature of its salts, and, what is still worse, would cause a name, which had been appropriated to one, to be transferred to another.

The only mode that appears practicable, is to derive the distinctive appellations of these salts from properties in which they differ. If two salts, formed from the same metal and the same acid, but only in different states of oxidation, differ in colour, as is frequently the case, this affords a ground of discrimination in their names, and

it is accordingly sometimes had recourse to. Thus, we speak of the green and the brown sulphate of iron. If the colour be the same in each, which may be the case, then the distinction may be drawn from any other property in which they differ. Thus the two muriates of mercury may be distinguished, the one by the appellation of Corrosive Muriate, the other by that of Mild Muriate. This nomenclature, while it violates no principle, has the advantage, that being founded on the properties of the substances, it is permanent; and as applied to medicinal substances, it has the not less important advantage, that it serves in the more important cases to point out the difference to which it is most essential to attend. If there should be even cases in which there is no difference of properties sufficiently important to afford a distinctive appellation, it would be better to have recourse to the periphrasis expressing the difference in the state of oxidation to discriminate between them, than to employ a nomenclature, neither sufficiently distinctive nor correct.

Metals are sometimes employed medicinally, combined with sulphur or with sulphuretted hydrogen. When the sulphur is united with the metal itself, the preparation is generally inactive. When the metal is oxidated, and farther combined, either with sulphur or sulphuretted hydrogen, it is more active; but as the degree of oxidation may be various, and as the affinities exerted by sulphur or sulphuretted hydrogen are not sufficiently energetic to render them definite, these preparations are liable to be variable in strength. Hence few of them are retained.

ARGENTUM.—SILVER.

NITRAS ARGENTI, *olim Causticum Lunare.* Nitrate of Silver. (Argenti Nitras, *Ph. Lond.*)

"Take of the Purest Silver, extended in plates and cut, four ounces; Diluted Nitrous Acid, eight ounces;

Distilled Water, four ounces. Dissolve the silver in a phial with a gentle heat, and evaporate the solution to dryness. The mass being put into a large crucible, let this be placed on the fire, which must be at first gentle, and gradually increased until the matter flow like oil. Then pour it into iron pipes, heated and rubbed with grease. Lastly, keep it in a glass vessel well stopt."

The silver in this process is oxidated and dissolved by the nitrous acid. By the subsequent fusion, a considerable part of the acid is expelled, so that the product is rather a sub-nitrate than a nitrate of silver. The metal ought to be pure, as in the state in which it is usually met with in commerce it has an alloy of copper, which gives to the preparation a green colour, and renders it more deliquescent. It is, as has already been stated, a powerful escharotic, and has the advantage of being easily applied, and confined, and of acting quickly. It is therefore the one in general use for the common purposes for which escharotics are employed.

ANTIMONIUM.—ANTIMONY.

SULPHURETUM ANTIMONII PRÆPARATUM, *olim Antimonium Præparatum.* Prepared Sulphuret of Antimony, formerly Prepared Antimony. (Sulphuretum Antimonii Præparatum, *Ph. Dub.*)

"Let Sulphuret of Antimony be prepared in the same manner as Carbonate of Lime."

This preparation is merely levigation, and when the sulphuret of antimony is levigated, it has been supposed to act with more certainty than when given in a coarser powder. It is still, however, very inactive. As a remedy in chronic rheumatism, it has been given in a dose of five or ten grains daily.

OXIDUM ANTIMONII CUM SULPHURE VITRIFICATUM, *olim Vitrum Antimonii.* Vitrified Sulphuretted Oxide of Antimony.

"Strew Sulphuret of Antimony, rubbed to a coarse powder like sand, on a shallow unglazed earthen vessel,

and apply to it a gentle fire, that the sulphuret of antimony may be slowly heated; at the same time stirring constantly the powder, that it may not run into lumps. White vapours, smelling of sulphur, will arise from it. When these, while the same degree of heat is kept up, cease, increase the heat a little, that vapours may again exhale; and proceed in this manner, until the powder, raised at length to a red heat, exhales no more vapours. This powder being put into a crucible, is to be melted with a strong fire, until it assume the appearance of fused glass; then pour it upon a heated brass plate." When solid, it has completely the vitreous appearance, is transparent in thin plates, and of a reddish brown colour.

In the first stage of this process, the greater part of the sulphur of the sulphuret of antimony is dissipated, and the antimony is imperfectly oxidated. In the second, the heat applied being more intense, the sulphur is more completely expelled, the antimony is more highly oxidated, and the oxide is vitrified. According to Thenard's analysis, this oxide contains 16 of oxygen in 100 parts. Proust has farther shown, that it retains a portion of sulphur combined with it, or, as he states it, a portion of the metallic sulphuret, (about one part in nine of the preparation), and lastly, Vauquelin found, that it always contains siliceous earth, which is discoverable by the gelatinous residuum obtained on evaporation of any saline compound formed from this oxide. The quantity appears to be about 9 or 10 parts in 100; it is derived from the earthy matter of the crucible, and probably promotes the vitrification of the oxide. This preparation is extremely harsh, and at the same time uncertain in its operation, and is hence not used but in preparing some of the other antimonials.

OXIDUM ANTIMONII VITRIFICATUM CUM CERA, *olim Vitrum Antimonii Ceratum.* Vitrified Oxide of Antimony with Wax.

"Take of Yellow Wax, one part; Vitrified Oxide of Antimony with sulphur, eight parts. To the wax, melted in an iron vessel, add the oxide rubbed to powder,

and roast them with a gentle fire, for a quarter of an hour, stirring constantly with a spatula; then pour out the matter, which, when it is cold, rub to powder."

It is probable, that during this process, the oxide of antimony loses part of its oxygen, from the carbonaceous matter of the wax attracting it, as it diminishes in weight; and it is probable also, that its state of vitrification is changed. It becomes much milder in operation. Though once highly recommended in dysentery, it may be regarded as an obsolete remedy. The dose in which it was given, was from five to fifteen grains, and its principal operation was that of a cathartic, from which probably any benefit received from it was derived.

OXIDUM ANTIMONII CUM PHOSPHATE CALCIS, *olim Pulvis Antimonialis.* Oxide of Antimony with Phosphate of Lime. (Pulvis Antimonialis, *Ph. Lond. Dub.*)

"Take of Sulphuret of Antimony, rubbed to a coarse powder, Hartshorn Shavings, of each equal parts. Mix and throw them into a wide iron pot, red hot, and stir them constantly until they are burnt into a matter of a gray colour, which remove from the fire, rub to powder, and put into a coated crucible. Lute to this crucible another inverted, in the bottom of which a small hole is drilled; apply the fire, which is to be gradually raised to a white heat, and kept at this increased heat for two hours. Lastly, triturate the matter, when cold, into a very fine powder." The process given in the Dublin Pharmacopœia is the same, except that the hartshorn is ordered to be previously boiled to extract from it the gelatin,—a circumstance of little importance, as this gelatin is decomposed by the heat. The London College have unfortunately changed the strength of the preparation, two parts of shavings of horn being employed to one of sulphuret of antimony. The reasons assigned for this are, that the preparation is brought nearer to the strength of *James's* powder, for which this is designed as a substitute, and that it is rendered more manageable in its administration. With regard to the first, it appears to be

founded on a mistake, as with the enlarged proportion of antimony, a preparation different in the proportions of its constituent parts from those of the James's powder, as analyzed by Pearson, must be obtained. And though it were just, it was of more importance to preserve an active preparation, now officinal, of the same strength in all the Pharmacopœias, than to assimilate it to the strength of an empirical remedy. With regard to the other, the powder appears to be just as manageable of the one strength as of the other.

This process has been introduced into the Pharmacopœias, as affording a preparation similar to the celebrated empirical remedy, *James's Powder*. Nothing more was known with regard to this, than that it was an antimonial, until its analysis was undertaken by Dr. Pearson. He found the genuine powder of James to consist of 43 parts of phosphate of lime, and 57 of an oxide of antimony, part of which was vitrified; and by the above formula, he was able to prepare a powder similar to it in qualities and chemical composition. The theory of the process is sufficiently obvious. During the first stage, the animal matter of the bones is decomposed and burnt out; the sulphur of the sulphuret of antimony is expelled, and the metal is imperfectly oxidated. In the second stage of the process, the metal is more completely oxidated, the oxide is partially vitrified, and is perhaps brought into combination with the phosphate of lime, which is the residuum of the bones. This latter supposition remains, however, uncertain. That portion at least of the oxide which is vitrified cannot be combined with the phosphate; the other perhaps may be in this state of combination, as Dr. Pearson supposed, though Chenevix, from his experiments on the powder, supposed them rather to be merely intimately mixed. He found too, that in the preparation obtained by Pearson's process, more of the oxide of antimony is vitrified than in the genuine James's powder, the proportion in the one being not less than 44 in 100 of the oxide, in the other only 28.

Mr. Chenevix has likewise proposed a method of obtaining this preparation in the humid way. It consists in taking equal weights of the white powder precipitated by water, from muriate of antimony, and of pure phosphate of lime, obtained by dissolving calcined bone in muriatic acid, and precipitating the phosphate by ammonia; dissolving these in as much muriatic acid as may be necessary, with the assistance of a moderate heat, and pouring this solution into ammonia diluted with distilled water. The ammonia combines with the muriatic acid, and the oxide of antimony and phosphate of lime are thrown down intimately mixed. This preparation may be more uniform in composition than that obtained by heat, as, in the latter, variations are liable to be introduced from the different degrees of oxidation of which antimony is susceptible, from the vitrification, and from the volatility of the antimonial oxide; but it cannot be the same compound as the other: it is indeed merely a mixture of sub-muriate of antimony and phosphate of lime. It has appeared, from some trials made of it, to be milder in its operation than the other preparation; but it would require much more extensive experience, to determine if it has the same medicinal effects.

The medical history of these preparations has been already delivered. James's powder has been celebrated as a remedy in febrile affections. It acts as a general evacuant, occasioning sweat, purging, and frequently vomiting; and, by this general action, appears sometimes to arrest the progress of fever, if given at its commencement, or to produce a more favourable crisis. Its dose is five or six grains, repeated every six hours, till its effects are obtained. It has been affirmed, that the preparation obtained by the process of the Pharmacopœias is not so certain nor so powerful in its operation as the powder of James, eight grains of the former being not more than equal to six of the latter. The difference, if it exist, may be owing to some peculiarity in the process, by which a difference of oxygenation, or of vitrification of the oxide may be occasioned; and, as has been

already stated, it does appear that the proportion of oxide vitrified is not the same in the one as in the other. It remains to be determined, how far the preparation from the proportions, as given now by the London College, differs from the others.

SULPHURETUM ANTIMONII PRÆCIPITATUM. Precipitated Sulphuret of Antimony. (Antimonii Sulphuretum Præcipitatum, *Ph. Lond.* Sulphur Antimoniatum Fuscum, *Ph. Dub.*)

"Take of Water of Potash, four pounds; Water, three pounds; Prepared Sulphuret of Antimony, two pounds. Boil them in a covered iron pot, on a gentle fire, for three hours, stirring frequently with an iron spatula, and adding water as it may be necessary. Strain the hot liquor through a double linen cloth, and to this strained liquor add as much diluted sulphuric acid as may be necessary to precipitate the sulphuret, which is to be carefully washed with warm water." The process as given by the London College is the same. In the Dublin Pharmacopœia, it differs a little, sub-carbonate of potash and sulphuret of antimony being melted together in a crucible, and the mass, when cold, being boiled with water; the liquor when clear being poured off, and the precipitate thrown down by diluted sulphuric acid. The product, however, will be the same.

From the analysis of this compound by Thenard, it appears to be composed of 68.3 of the orange-coloured oxide of antimony, (which consists of 18 of oxygen, and 82 of antimony), 17.8 of sulphuretted hydrogen, and 11 or 12 of sulphur. The theory of its formation is somewhat intricate. In boiling the sulphuret of antimony with the potash, a sulphuret of potash is formed, and this decomposing part of the water, a sulphuretted hydro-sulphuret of potash is also produced; the antimony appears to be at the same time oxidated, probably by the sulphuretted hydrogen acting as a weak acid. This oxide is retained in solution by the sulphuretted hydro-sulphuret of potash. When sulphuric acid is added, it unites with the potash; a little of the sulphuretted hydro-

gen is disengaged with effervescence, and the antimonial oxide, combined with the remaining sulphuretted hydrogen and with the sulphur, is precipitated. The compound, therefore, is a sulphuretted hydro-sulphuret of oxide of antimony. The name given to it in the Pharmacopœias does not at all express its real nature.

When the liquor obtained by boiling the solution of potash on the sulphuret of antimony is strained, and allowed to cool, it deposites a red-coloured powder, which has been known by the name of *Kermes Mineral*, and has been much used on the continent. From the analysis of it by Thenard, it appears to be a compound of brown oxide of antimony and sulphuretted hydrogen, with a small portion of sulphur; the proportions being 73 of oxide of antimony, 20 of sulphuretted hydrogen, and 4 of sulphur, the last, as Thenard supposes, being accidental. Trommsdorff attributes the difference between these two preparations to the one *essentially* containing sulphur combined with the oxide of antimony and sulphuretted hydrogen; the other not. Thenard ascribes it rather to a difference of oxygenation, the oxide in the *kermes* being less highly oxidated than in the other; but as both can be obtained from the same solution, either as we allow it merely to cool, or as we add sulphuric acid, which cannot change the state of oxidation, this is not probable, while the difference in the proportion of sulphur must, from the nature of the process, necessarily exist; for in the one case, the oxide can be combined only with those portions of sulphur and sulphuretted hydrogen which it can attract, while in the other, the sulphur precipitated by the addition of the acid must be also added. The one preparation, the Kermes Mineral, may be distinguished, though not perfectly correctly, by the name of Hydro-Sulphuretum Oxidi Antimonii Rubrum; the other by that of Hydro-Sulphuretum Oxidi Antimonii Luteum. The quantity of both products, from a given weight of sulphuret of antimony, may be considerably increased by adding a portion of sulphur, and increasing the quantity of alkali, the proportion of

sulphur in the native sulphuret not being sufficient to render the whole of the metal soluble, and a quantity, therefore, without this addition, remaining undissolved.

These preparations agree nearly in their medicinal qualities, which are similar to those of the other antimonials. They have been used principally as diaphoretics and sudorifics, but are always uncertain in their operation. The dose of the precipitated sulphuret of antimony, as it is named, is five or six grains.

OXIDUM ANTIMONII CUM SULPHURE PER NITRATEM POTASSÆ, *olim Crocus Antimonii.* Oxide of Antimony with Sulphur, by Nitrate of Potash.

"Take of Sulphuret of Antimony, Nitrate of Potash, of each the same weight. Triturate them separately, and, having mixed them well together, throw them into a crucible red-hot. The deflagration being over, separate the reddish matter from the white crust, and rub it to a powder, which is to be frequently washed with warm water, until it remain insipid."

During the deflagration, the nitric acid of the nitrate of potash is decomposed, and its oxygen is attracted, partly by the sulphur, and partly by the antimony. The sulphurous acid, which is the principal product of the oxygenation of the sulphur, is in part dissipated, and in part combined with the potash; and with a little sulphuric acid likewise produced, forms the white crust which is directed to be removed. By the union of another portion of the oxygen with the antimony, a brown or reddish oxide is formed. It appears also that part of the sulphuret of antimony escapes decomposition or oxygenation, and remains combined with the oxide, in the proportion of about two parts to eight; or rather, perhaps, the oxide retains a little sulphur combined with it. The preparation, therefore, is an imperfect oxide of antimony with sulphur or sulphuret of antimony. It is of a brick red colour: what is to be found in the shops is generally of a gray colour, and is usually prepared very improperly, with a diminished proportion of nitre.

As an antimonial, this preparation is so uncertain in its operation, that it is never prescribed; it is used in making some of the other preparations of this metal.

Murias antimonii. Muriate of Antimony.

"Take of Oxide of Antimony with Sulphur by Nitrate of Potash, Sulphuric Acid, of each one pound; Dried Muriate of Soda, two pounds. Pour the sulphuric acid into a retort, adding gradually the muriate of soda and the oxide of antimony, previously mixed. Then distil from warm sand. Expose the distilled matter for some days to the air, that it may deliquesce; then pour the liquid part from the impurities."

In this mode of forming muriate of antimony, the muriate of soda is decomposed by the sulphuric acid combining with the soda; the muriatic acid disengaged, unites with the oxide of antimony, and the compound is volatilized. It is at first of a soft consistence, and cannot be dissolved by pouring water upon it, the mass of water acting on it, by its quantity, and decomposing it, separating a sub-muriate. But, when left exposed to the air, it slowly imbibes as much water as is sufficient for its solution without decomposition, and then forms a dense heavy liquid of a brown colour. By the addition of water to this, the same decomposition is produced, and sub-muriate precipitated.

This preparation is unfit for internal use; externally it has sometimes been used as a caustic. Decomposed by potash, it affords an oxide which has been used in preparing the tartrate of antimony.

Muriate of Antimony has not directly a place in the London or Dublin Pharmacopœia; but a process is given for preparing it, with the view of obtaining from it another antimonial preparation,—probably a sub-muriate, though denominated an oxide.

ANTIMONII OXYDUM, Ph. Lond.—(Oxydum Antimonii Nitro-Muriaticum, *Ph. Dub.*)

"Take of Sulphuret of Antimony in powder, two ounces; Muriatic Acid, eleven fluid ounces; Nitric Acid, one fluid ounce. To the acids mixed together in a glass vessel, add gradually the Antimony, and digest them with a boiling heat for an hour; then strain the liquor, and pour it into a gallon of water, in which two ounces of Sub-Carbonate of Potash have been previously dissolved. Wash the precipitated powder, by pouring water frequently upon it, until no acid remain, then dry it on bibulous paper." This is the process given in the London Pharmacopœia. In the Dublin, only a drachm of nitrous acid is employed, and the liquor obtained by digesting the materials is decomposed, and the precipitate thrown down, by adding to it a gallon of water, without any sub-carbonate of potash.

Muriatic acid acts very feebly on antimony, not being capable of communicating to it oxygen directly, and the affinity to this principle not being sufficiently strong as to be able, even when aided by the resulting affinity of the acid, to decompose water. By the addition of nitric acid, the oxidation and solution are more easily effected, the nitric acid yielding oxygen to the metal, and the oxide combining with the muriatic acid. The sulphur of the sulphuret suffers little change. The strained liquor, therefore, is a muriate of antimony, and this is undoubtedly at once the most simple and most economical method of procuring it. In the subsequent stage of the process, it is decomposed by the addition, according to the one formula, of a weak solution of sub-carbonate of potash; according to the other, by the addition of water. The precipitate thrown down from muriate of antimony by water used to be regarded as an oxide, but it was long ago shown by Rouelle to be a sub-muriate; the water, by its affinity to the acid, abstracting the greater portion of it; but the oxide still, in conformity to the law which usually regulates these de-

compositions, retaining a portion of the acid combined. If the sub-muriate, after being precipitated, is thoroughly washed with water, and then digested with a solution of potash or sub-carbonate of potash, a considerable portion of this acid is abstracted, though probably not the whole of it; for the influence of quantity on the affinity exerted by the oxide to the acid is always becoming more powerful as the abstraction proceeds, and will cause a part of the acid to be retained. In the method of applying the sub-carbonate of potash directed by the London College, though designed probably to abstract the acid more effectually from the oxide, it is of no advantage in this respect, though it may increase a little the quantity of precipitate. By the agency of the water of the solution the muriate is decomposed, and the sub-muriate thrown down, the liquor above retaining the excess of muriatic acid: This excess of acid the alkali will be spent in neutralizing, and will probably be even insufficient for this; it will thus be prevented from acting on the precipitate, so as to abstract any of the acid it contains, at least, unless it were employed in much larger quantity than is ordered by the College. The method of applying with effect the quantity they use, would be to precipitate the muriate with water, remove the acidulous liquor above, wash the precipitate, and then submit it to the agency of the sub-carbonate, by digesting them with a small portion of water. A considerable part of the acid might then be abstracted.

This preparation is not designed for internal administration, but merely for the preparation of other antimonials, and especially of the tartrate of antimony and potash.

TARTRIS ANTIMONII, *olim Tartarus Emeticus.* Tartrite of Antimony, formerly Emetic Tartar. (Antimonium Tartarizatum, *Ph. Lond.*—Tartarum Antimoniatum sive Emeticum, *Ph. Dub.*)

"Take of Oxide of Antimony with Sulphur by Nitrate of Potash, three parts; Super-Tartrate of Potash, four parts; Distilled Water, thirty-two parts. Boil them

in a glass vessel for a quarter of an hour. Strain through paper, and put aside the strained liquor that crystals may form." This is the process in the Edinburgh Pharmacopœia. That which has now a place in the London and Dublin Pharmacopœias is different, principally in the antimonial oxide that is employed. It is thus given in the former. "Take of Oxide of Antimony," (the precipitate from the muriate described in the preceding process,) "two ounces; Super-tartrate of Potash in powder, three ounces; Distilled Water, eighteen fluid-ounces. To the water boiling in a glass vessel throw in gradually the antimony and super-tartrate of potash mixed together, and boil for half an hour; then strain the liquor through paper, and boil it down with a gentle heat in a glass vessel, so that while it cools slowly, crystals shall form." The process is the same in the Dublin Pharmacopœia, except that only two ounces and a half of super-tartrate of potash are used.

The excess of tartaric acid in the super-tartrate of potash is capable of combining with a number of the metallic oxides, and of forming ternary compounds. With oxide of antimony, when not too highly oxidated, it unites with facility, forming a combination of this kind, which constitutes the present preparation. As the tartaric acid is saturated, partly by potash, and partly by oxide of antimony, it is not a pure tartrate of antimony, but a tartrate of antimony and potash, and the name given to it in all the Pharmacopœias is chemically incorrect, and is so without any necessity or advantage. According to the analysis of it by Thenard, it consists of 38 parts of oxide of antimony, 34 of tartaric acid, 16 of potash, and 8 of water. It is liable, however, to vary considerably in the proportions of its constituent principles according to the process by which it has been prepared.

These processes have been very various, this being the most important of all the antimonials, and having therefore much engaged the attention of chemists. The principal object of their researches has been to obtain

an oxide, not too expensive in its preparation, and which shall combine with facility with the tartaric acid. The oxide precipitated by potash from muriate of antimony was recommended by Bergman, and employed in the process given in the preceding edition of the Edinburgh Pharmacopœia, but was liable to the former objection, being obtained by a process somewhat difficult, and therefore expensive, and hence, though ordered by the College, not being employed by the apothecary. They have, therefore, substituted the brown oxide prepared by deflagration of sulphuret of antimony with nitre. This answers sufficiently well, if it has been properly prepared. As met with in the shops, it is, however, almost always unfit for this purpose; as, from not being prepared with the due proportion of nitrate of potash, it is not sufficiently oxidated. The vitrified oxide is, perhaps, the most unexceptionable; it cannot be in an improper state of preparation; being prepared on a large scale, it is not expensive, and it is capable of sufficiently saturating the tartaric acid. It was accordingly recommended by Dr. Black. The principal objection to it is, that it contains a portion of siliceous earth, which accompanies the oxide of antimony in its combination with the tartaric acid, and, when the liquor is considerably evaporated, gives to it a gelatinous consistence, and prevents the crystallization. This, however, scarcely forms a just objection, for it is always proper in the crystallization of this salt not to carry the evaporation of its solution too far. The process of crystallization itself appears to produce a division in the principles of the combination, the crystals which form first containing more oxide of antimony than those produced by a farther evaporation, and there remaining at length an uncrystallizable liquid, in which there appears to be an excess of potash combined with the acid and a portion of oxide. As the silex, therefore, does not impede the first crystallization, and as any further crystallization ought not to be attempted, its presence can scarcely be regarded as injurious, and the vitrified oxide is still per-

haps the best on the whole that can be employed. The oxide or sub-muriate introduced by the London and Dublin Colleges is essentially the same with that recommended by Bergman, but being obtained by a much easier process, is not liable to the same objection. It appears, too, to be more easily dissolved by the tartaric acid than any other. The principal doubt that can be suggested with regard to it is, whether, being a sub-muriate, the muriatic acid enters into the constitution of the salt that crystallizes, and modifies its powers. It is possible that it may, and it is equally possible that the small quantity of it which is present may remain in combination with the potash in the residual liquor. If the latter be the case, there can be no just objection to its use. Another source of diversity in the strength of this preparation having perhaps a still greater influence than the oxide employed, is the extent to which the solution is evaporated to cause it to crystallize; the farther the evaporation is carried, more of the potash entering into the composition of the crystals, and the crystals obtained by a second crystallization, when this is practised, being from this cause, too, of a different composition from those of the first.

Tartrate of antimony and potash crystallizes in small triedral pyramids, which are efflorescent. Its solubility has been variously stated, and appears to vary according to the quantity of antimonial oxide contained in it, from proper preparation. On an average, it is soluble in fifteen parts of water at 60°. According to Dr. Saunders, one ounce of water at 60° dissolves fifty-two grains of the fully saturated salt; while of that generally met with, it dissolves from thirty-two to thirty-five. This affords even a mode of judging of the strength of this preparation. It is very susceptible of decomposition, suffering it not only from alkalis, earths, acids, and a number of neutral salts, but even from vegetable infusions and decoctions, the vegetable matter attracting apparently part of the oxygen of the oxide,—decompositions the occurrence of which requires to be guarded against in extemporaneous prescription. If kept dissolved in water,

it is also decomposed, from the spontaneous decomposition of the tartaric acid.

This preparation is undoubtedly superior to the other antimonials, in the certainty of its operation, at least as an emetic, and, from its solubility, is more manageable with regard to dose. Its medicinal applications have been already noticed. It is given as an emetic in a dose of from one to three grains, dissolved in water; and, in smaller doses, as an expectorant and diaphoretic.

VINUM TARTRITIS ANTIMONII, *olim Vinum Antimoniale.* Wine of Tartrite of Antimony.

"Take of Tartrite of Antimony, twenty-four grains; White Wine, one pound. Mix, so that the tartrite of antimony may be dissolved."

Antimonial Wine, as it was named, was formerly prepared by macerating white wine on the vitrified oxide of antimony in powder, the tartaric acid of the wine dissolving a portion of the oxide, so that the wine acquired the powers of an antimonial preparation. It was liable, however, to be variable in strength, from the proportion of acid in the wine not being uniform. The present preparation was therefore substituted for it. It may be doubted, however, whether it is properly officinal. The salt, dissolved in wine, can indeed be preserved longer without decomposition than when dissolved in water; but, even on long keeping, part of the antimonial oxide is deposited. It is given as an emetic in the dose of one ounce; as a diaphoretic, in a much smaller dose.

LIQUOR ANTIMONII TARTARIZATI, Solution of Tartarized Antimony. Ph. Lond.

"Take of Tartarized Antimony, a scruple; Boiling Distilled Water, four fluid ounces; Wine, six fluid ounces. Dissolve the tartarized antimony in the boiling distilled water; then add the wine."

This preparation is of the same strength as the preceding one belonging to the Edinburgh Pharmacopœia,

two grains of the tartrate of antimony and potash being contained in an ounce. The dilution of the wine renders it a little more economical, but it is not improbable may have the disadvantage of admitting more readily of the spontaneous decomposition of the metallic salt.

CUPRUM.—COPPER.

AMMONIARETUM CUPRI, *olim Cuprum Ammoniacum.* Ammoniuret of Copper. (Cuprum Ammoniatum, *Ph. Lond. Dub.*)

"Take of Pure Sulphate of Copper, two parts; Carbonate of Ammonia, three parts. Rub them thoroughly in a glass mortar, until all effervescence is finished, and they unite uniformly into a violet-coloured mass, which, being wrapt in bibulous paper, is to be dried, first on a chalk stone, and afterwards with a gentle heat. It is to be kept in a glass phial well stopt."

The sulphate of copper is decomposed by the carbonate of ammonia. One portion of ammonia combines with the sulphuric acid; another portion of it unites with the oxide of copper, and the violet-coloured mass which is formed is a mixture of the two resulting compounds; or, perhaps, what is more probable, the sulphuric acid is in combination with the two bases, forming a ternary compound; the water of the two salts rubbed together, renders the new compound, when it is formed, soft or moist; and the carbonic acid is disengaged with effervescence. The preparation is of a dark-blue colour, which it retains when dried. It has been chiefly employed as a remedy in epilepsy. It is given in a dose of at first half a grain twice a-day, which is gradually and slowly increased to two or three grains, and continued for some time; and for internal administration, it has the advantage, over the salts of copper, of being less liable to excite vomiting.

Liquor cupri ammoniati. Solution of Ammoniated Copper. Ph. Lond.

"Take of Ammoniuret of Copper, a drachm; Distilled Water, a pint. Dissolve the ammoniuret of copper in the water, and filtre the solution through paper."

This is a simpler mode of obtaining a preparation which has had a place in the Pharmacopœias, obtained by an indirect mode given in the following formula, which retains its place in the Dublin Pharmacopœia:

Aqua cupri ammoniati. Water of Ammoniated Copper. Ph. Dub.

"Take of Lime Water, eight ounces; Muriate of Ammonia, two scruples; Prepared Verdigris, four grains. Mix them together, and digest for twenty-four hours; then pour off the pure liquor."

In this indirect mode of combining oxide of copper with ammonia, the lime decomposes the muriate of ammonia, by combining with the muriatic acid, and the disengaged ammonia combines with the oxide of copper of the verdigris or sub-acetate of copper, forming a dilute solution of ammoniureted oxide of copper. It has been applied, diluted with an equal part of water, as a mild escharotic, to remove specks from the cornea, and sometimes, in its undiluted state, as a stimulant and escharotic to ulcers.

Solutio sulphatis cupri composita, *olim Aqua Styptica.* Compound Solution of Sulphate of Copper.

"Take of Sulphate of Copper, Sulphate of Alumine, of each three ounces; Water, two pounds; Sulphuric Acid, one ounce and a half. Boil the sulphates in water, that they may be dissolved; then to the liquor strained through paper add the acid."

This is merely a combination of powerful astringents. It has been applied topically to check hæmorrhage, and, largely diluted with water, as a wash in purulent ophthalmia.

FERRUM.—IRON.

FERRI LIMATURA PURIFICATA. Purified Filings of Iron.

"A sieve being placed over the filings, let a magnet be applied, that the filings may be drawn through the sieve upwards."

The iron, from the facility with which it is attracted by the magnet, is by this operation obtained nearly pure, the interposition of the sieve in a great measure preventing particles of other metals, or impurities which are generally mixed with the iron-filings got from the workshops, from being entangled in the cluster which adheres to the magnet. The process, though not always attended to in the shops, is a very necessary one, where iron is to be medicinally employed in this form, or where it is to serve for other preparations of this metal.

OXIDUM FERRI NIGRUM PURIFICATUM, *olim Ferri Squamæ Purificatæ*. Purified Black Oxide of Iron, formerly Purified Scales of Iron. (Oxydum Ferri Nigrum, *Ph. Dub.*)

"Let the scales of black oxide of iron, which are found at the anvils of the workmen, be purified by the application of the magnet; for the magnet attracts only the more thin and pure scales, leaving those which are larger and less pure." The Dublin College direct that the purified scales shall be farther reduced to a fine powder by levigation, in the same manner as chalk.

The scales of iron are the small fragments struck off from the metal when it is heated redhot. Passing through the atmosphere, at this temperature, they are oxidated, but so imperfectly, as to retain their magnetic quality, and therefore to admit of this mode of purification by the magnet. They are used only in making some of the other chalybeate preparations.

CARBONAS FERRI PRÆPARATUS, *olim Rubigo Ferri Præparata*. Prepared Carbonate of Iron, formerly Prepared Rust of Iron. (Ferri Rubigo, *Ph. Dub.*)

"Purified Filings of Iron are to be frequently mois-

tened with water till they fall into rust, which is to be rubbed to a fine powder."

During exposure to air and moisture, iron is oxidated, and this oxide is found to be combined with carbonic acid, absorbed probably from the atmosphere. As a chalybeate it is rather more active than the pure metal, and more mild than the other saline combinations of iron. Its dose is from 10 to 20 grains. In a large dose it is liable to occasion uneasiness at the stomach.

CARBONAS FERRI PRÆCIPITATUS. Precipitated Carbonate of Iron. (Ferri Carbonas, *Ph. Lond. Dub.*)

"Take of Sulphate of Iron, four ounces; Carbonate of Soda, five ounces; Water, ten pounds. Dissolve the sulphate of iron in the water; then add the carbonate of soda, previously dissolved in as much water as may be necessary, and mix them well together. Let the carbonate of iron, which is precipitated, be washed with warm water, and afterwards dried."

On mixing the solutions of carbonate of soda and sulphate of iron, the soda attracts the sulphuric acid; the carbonic acid combines with the oxide of iron; the sulphate of soda remains in solution; the carbonate of iron is precipitated. It is to be remarked, however, with regard to this, and all the saline combinations of iron, that the metal enters into them in different states of oxidation, and thus produces very different salts. There is one oxide, the black, nearly at the *minimum*, containing, according to Lavoisier's estimate, 27 of oxygen in 100, which forms one order of salts; there is another, the red oxide, at the maximum, which, according to Proust, contains 0.48, which is the base of another series of saline compounds, and between these, are probably also intermediate combinations. In the present process, the sulphate of iron which is employed containing the metal in the low state of oxidation, it is this oxide which combines with the carbonic acid; but the compound attracts very rapidly oxygen from the atmospheric air, so as to pass to a higher state of oxidation, and the precipitate

of carbonate of iron, in washing and drying, changes its colour, from this cause, from a dark green to a reddish brown. It differs ultimately, therefore, in little from the rust of iron, except that it may be somewhat purer.

Carbonate of iron, containing the metal at a low state of oxidation, is a mild and not inactive preparation, preferable to the carbonate or rust, in which the iron is in a higher state of oxidation, as sitting easier on the stomach. The formula of Griffith, which has been highly celebrated as a chalybeate, it has already been remarked, is a preparation of this kind; and as introduced into the London Pharmacopœia, under the name of Mistura Ferri Composita, has been already considered, (p. 25.) It is as an extemporaneous preparation (in which only it is obtained at the low state of oxidation) that it ought to be used; and it has probably little advantage over the common rust of iron in the state in which it is obtained by the present process.

SULPHAS FERRI, *olim Vitriolum Viride.* Sulphate of Iron. (Ferri Sulphas, *Ph. Lond. Dub.*)

"Take of Purified Filings of Iron, six ounces; Sulphuric Acid, eight ounces; Water, two pounds and a half. Mix them; and the effervescence being over, digest for a short time in a sand-bath; then strain the liquor through paper, and, after due evaporation, put it aside that crystals may form."

Iron decomposes water very slowly at a low temperature, but when aided by the action of sulphuric acid the decomposition goes on rapidly. The effect in this case may be ascribed to the concurrent affinities of the iron to oxygen, of the acid or rather the base of the acid to oxygen, and of the acid to iron. These co-operating prevail over the single affinity of the oxygen to the hydrogen of the water: the water therefore is decomposed; its oxygen, the iron, and the acid unite, and the hydrogen is disengaged in the elastic form. The iron in this combination is at a low state of oxidation, the *minimum* nearly; and the salt which it forms is the Green Sulphate

of Iron, so named, to distinguish it from the Red Sulphate, in which the metal is more highly oxidated. This green sulphate is prepared for the various purposes to which it is applied in the arts, on a large scale, by exposing the native sulphuret of iron to air and moisture; but, by the present process, it is obtained in a purer state, and fitter therefore for medicinal use. Its crystals are of a light green colour; the residual liquor, by a second evaporation, affords crystals of a darker green, in which the metal appears to exist more highly oxidated. In the shops there is often substituted for this salt the common green vitriol, purified by a second crystallization, a little acid having been added to the solution, to dissolve any excess of oxide.

Sulphate of iron is one of the most active preparations of the metal. Its medium dose is from three to five grains.

SULPHAS FERRI EXSICCATUS. Dried Sulphate of Iron. (Sulphas Ferri Exsiccatum, *Ph. Dub.*)

"Take of Sulphate of Iron, any quantity. Heat it in an unglazed earthen vessel, on a gentle fire, until it become white and perfectly dry."

This is merely the sulphate of iron freed from its water of crystallization by the application of heat. It is not medicinally employed, but has a place in the Pharmacopœia from being used in one or two pharmaceutical preparations.

OXIDUM FERRI RUBRUM. Red Oxide of Iron. (Oxidum Ferri Rubrum, *Ph. Dub.*)

"Let dried Sulphate of Iron be exposed to a violent heat, until it is converted into a red coloured matter."

By an intense heat, sulphate of iron is decomposed; its acid is partly expelled, and in part suffers decomposition, being evolved in the state of sulphurous acid; the metal at the same time becomes more highly oxidated. The red oxide is the residuum. To free it more completely from any adhering acid, the Dublin College

order it to be washed with water. It is scarcely medicinally employed, but is used in some pharmaceutical preparations.

TINCTURA MURIATIS FERRI. Tincture of Muriate of Iron. (Tinct. Muriatis Ferri, *Ph. Lond. Dub.*)

"Take of the Purified Black Oxide of Iron, in 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, when the powder is dissolved, add as much alkohol as that there shall be of the whole liquor two pounds and a half." The process, as given by the London and Dublin Colleges, differs in the rust or carbonate of iron being employed, and in the proportions being somewhat different. The following is the formula in the London Pharmacopœia: "Take of Carbonate of Iron, half a pound; Muriatic Acid, a pint; Rectified Spirit, three pints. On the carbonate of iron, in a glass vessel, pour the muriatic acid, and agitate them occasionally for the space of three days. Put the liquor aside, that the impurities may subside, and having poured it off, add the spirit." In the Dublin Pharmacopœia, three pounds of muriatic acid are poured on half a pound of rust of iron; after digestion, the liquor is reduced by evaporation to a pound, and three pints of rectified spirit are added to it. It must therefore be stronger than the other.

Iron, in combining with acids, it has already been remarked, unites with them in different degrees of oxidation; and when at the two extremes, or the *minimum* and *maximum*, forms with the same acid very different salts. This is well displayed in its combination with muriatic acid. When metallic iron is dissolved in the acid, the solution is of a pale green colour, and affords crystals of a similar colour on evaporation. This salt is soluble in water, but is insoluble in alkohol. When the red oxide or the carbonate is dissolved in the acid, the solution is of a yellow colour; it is not crystallizable, but by evaporation is reduced to a deliquescent mass; it is soluble

in water, and is abundantly soluble in alkohol. Of course, it must be this salt which forms the basis of the tincture formed by the present process. In the process, as performed according to the formula of the Edinburgh Pharmacopœia, the black oxide which is employed combines with the muriatic acid, and during the solution acquires more oxygen, principally from a partial decomposition of the water, which is promoted by the heat applied. The muriate of iron, in which this more perfect oxide is contained, is soluble in the alkohol, diluted as it is by the water of the acid; yet even with this, the metal is scarcely sufficiently oxidated to form the salt, which is entirely soluble in alkohol. The tincture formed is of a pale green colour; and it even sometimes happens, that on adding the alkohol to the solution of iron, a great part of the salt is precipitated in crystalline grains. But in a short time, from exposure to the air, oxygen is absorbed, the colour deepens to a yellow, and the precipitate is dissolved. In the process given in the other Pharmacopœias, the metal is submitted to the action of the acid in a higher state of oxidation; and the compound is at once formed, which is soluble in alkohol. It may therefore be supposed to be preferable, as there is some risk of the other not being properly prepared, from the tincture being perhaps poured off from the precipitate, instead of being allowed to remain over it until it is dissolved. It appears, however, that the metal may be too highly oxidated to remain in combination with the acid, this tincture always depositing a sediment of oxide when long kept, and this is more liable to happen when the metal is even at the first in a highly oxidated state.

This tincture is a very grateful preparation; the alkohol appears to suffer some chemical change from the action of the acid and the metallic oxide, the odour becoming ethereal. It is a preparation also highly active. It is given in the diseases in which iron is employed, in a dose from ten to twenty drops, largely diluted with water, or, what is more grateful, in wine. If it produce irritation at the stomach, as it is liable to do from its activity, the dose must be diminished.

The Dublin College have inserted another tincture of muriate of iron, under the name of TINCTURA MURIATIS FERRI cum OXIDO RUBRO. It differs in little from the other tincture which they have admitted, in which the rust or carbonate is dissolved by the acid, but in being prepared from the red oxide, and must be regarded as altogether superfluous.

MURIAS AMMONIÆ ET FERRI, *olim Flores Martiales.* Muriate of Ammonia and Iron. (Ferrum Ammoniatum, *Ph. Lond.*—Murias Ammoniæ et Ferri, *Ph. Dub.*)

"Take of Red Oxide of Iron, washed and again dried, Muriate of Ammonia, of each equal weights. Mix them well together, and sublime." The London College order Carbonate of Iron.

Oxide of iron decomposes muriate of ammonia, by attracting the muriatic acid, and, in the present process, this decomposition takes place, ammoniacal gas being exhaled. But, from the proportions of the substances employed, part of the muriate of ammonia escapes decomposition, is sublimed by the heat applied, and elevates with it part of the muriate of iron that had been formed; or rather, perhaps, the oxide of iron enters into combination with the acid and part of the ammonia, forming a triple compound. Whichever of these is the result, the process is an unscientific mode of obtaining a muriate of iron: the preparation, too, has been found uncertain in strength, more of the muriate of iron being sublimed, according as the heat is applied strongly and quickly; and, accordingly, it has now fallen into disuse. It was principally employed as a remedy in rickets, in the dose, to children, of two or three grains. It is in crystalline grains, of a yellow colour, and somewhat deliquescent.

TINCTURA FERRI AMMONIATI. Pharm. Lond.

"Take of Ammoniated Iron, four ounces; Proof-Spirit, one pint. Digest and strain."

This solution of the preceding compound is an unnecessary preparation, as it differs little from the tincture of muriate of iron, and must be less certain with regard to strength.

FERRUM TARTARISATUM. Tartarised Iron. Ph. Lond.

"Take of Iron, one pound; Super-Tartrate of Potash, in powder, two pounds; Distilled Water, one pint. Rub them together, and expose the mixture to the air in an open glass vessel for eight days; then dry it by a sand-bath, and rub it into a very fine powder. To this, having again added a pint of water, put it aside for eight days, then dry it, and rub it into a powder."

By exposure to air and moisture, the iron is oxidated, and its oxide combines with the excess of acid in the super-tartrate of potash, a triple salt resulting, composed of potash, oxide of iron, and tartaric acid. By repeating the trituration and exposure to the air in a humid state, the oxidation of the iron is rendered more complete. The Dublin College give the following formula, by which the saline combination is rendered still more perfect:

TARTARUM FERRI. Tartar of Iron. Ph. Dub.

"Take of Carbonate of Iron, half an ounce; Crystals of Tartar in fine powder, one ounce; Distilled Water, a pint. Boil them together in a glass vessel, over a slow fire, for an hour, and filtrate the liquor through paper. After it has cooled, and has been filtrated a second time, evaporate it until a pellicle appear on its surface. The liquor, as it cools, will form a saline mass, which is to be reduced to powder, and kept in close vessels."

This is the proper tartrate of iron and potash, as much of the oxide of iron of the carbonate, as the free tartaric acid of the super-tartrate of potash requires for saturation, being dissolved, and the ternary compound being obtained by evaporation. Both this, and the less perfect analogous compound obtained by the preceding process, have been introduced as mild, and, at the same time,

active preparations of the metal. It is easily soluble in water, and may therefore be given in a state of solution, and considerably diluted, a form in which the saline preparations of iron always prove less irritating. The dose is from five to fifteen grains. The preparation obtained by the formula of the Dublin College has not only been employed in the usual diseases in which iron is prescribed, but has also been highly recommended as a remedy in dropsy, from the combination of its tonic with a diuretic power.

VINUM FERRI. Wine of Iron. Ph. Lond. (Vinum Ferri, *Ph. Dub.*)

"Take of Iron-Filings, two ounces; Wine, two pints. Mix them together, and put aside for a month, shaking them frequently; then strain through paper." In the process given by the Dublin College, four ounces of iron wire cut, are mixed with four pints of Rhenish white wine; the iron being first sprinkled with a little of the wine until it is covered with rust, the remaining wine being then digested on it for seven days, and afterwards strained.

The tartaric acid of the wine contributes to the oxidation of the iron, and dissolves the oxide; and in the mode directed by the Dublin College, being aided by the action of the air, the oxidation, and consequent impregnation of the wine with iron, will probably take place to a greater extent. The acidity of the Rhenish wine will likewise contribute to this. Still the preparation must be liable to be variable in strength. It has been given as a chalybeate in a dose of one or two drachms.

ACETAS FERRI. Acetate of Iron. Ph. Dub.

"Take of Carbonate of Iron, half an ounce; Acetic Acid, three ounces. Digest them for three days, and strain the liquor."

In this process, the acetic acid dissolves the iron, and may afford a mild and active chalybeate, probably, how-

ever, not differing much in its operation from the tartrate of iron. But, besides this, the Dublin College have ordered not less than two tinctures of acetate of iron.

TINCTURA ACETATIS FERRI. Tincture of Acetate of Iron. Ph. Dub.

"Take of Acetate of Potash, two ounces; Sulphate of Iron, one ounce; Rectified Spirit, two pounds. Rub together the acetate of potash, and the sulphate of iron, in an earthen mortar, until they form a mass of a soft consistence. Dry this with a moderate heat, and when dried, triturate it with the spirit. Digest the mixture in a phial closely corked for seven days, agitating it frequently. When the impurities have subsided, pour off the clear liquor."

TINCTURA ACETATIS FERRI CUM ALKOHOL. Tincture of Acetate of Iron with Alkohol. Ph. Dub.

"This is prepared in a similar manner, from one ounce of Sulphate of Iron, an equal weight of Acetate of Potash, and two pounds of Alkohol."

In the action of acetate of potash on sulphate of iron, the greater part of the acetic acid will be combined with the oxide of iron, forming acetate of iron, while the sulphuric acid is united with the potash, so as to form sulphate of potash, at least these binary combinations will be rendered more complete by the action of the alkohol added, sulphate of potash being nearly insoluble in that liquid, while acetate of iron can be dissolved. During the trituration too, it is probable that the oxide of iron absorbs oxygen from the air, and the salt formed, therefore, will be the one containing the metal at the higher degree of oxidation, and which alkohol more easily dissolves. The tincture may have the advantage over the watery solution of acetate of iron formed by the preceding process, of being less liable to spontaneous decomposition; but it must be regarded as altogether superfluous to have two tinctures differing probably in little more than in strength, or indeed to have more than one

form of acetate of iron, if there was even any necessity for its introduction as an officinal preparation, which is doubtful.

LIQUOR FERRI ALKALINI. Alkaline Solution of Iron. Ph. Lond.

"Take of Iron, two drachms and a half; Nitric Acid, two fluid ounces; Distilled Water, six fluid ounces; Solution of Sub-carbonate of Potash, six ounces. Pour the acid and the water mingled together on the iron; and when the effervescence has ceased, pour off the liquor while still acid. Add to this gradually, and at intervals, the solution of sub-carbonate of potash, agitating frequently, until the colour, having become of a brownish red, effervescence is no longer excited. Put it aside for six hours, and then pour off the liquor."

This is a preparation, which has long been known under the name of Martial Alkaline Tincture, and the nature of it is not very well ascertained. The iron is oxidated and dissolved by the nitric acid; and the solution which answers best for its preparation, appears to be that in which the iron is in a low state of oxidation, and in which there is an excess of acid; this is obtained by the solution being effected slowly, and, when in this state, it is of a pale green colour. On adding the sub-carbonate of potash, the alkali saturates a portion of the acid, and the oxide or rather sub-nitrate is precipitated, but by agitation it is kept suspended, and by the excess of alkali is redissolved, this being accompanied with effervescence from the disengagement of part of the carbonic acid. According to this view, therefore, the liquid is a ternary compound of oxide of iron, nitric acid and potash. It has often been remarked, however, by the chemists, that more of the precipitate is redissolved, when carbonate of potash is employed, that when pure potash is used; and this would lead to the conclusion, that a portion of the carbonic acid is likewise retained in the combination, and probably contributes, by its action on the alkali and the oxide, to maintain the state of solution. On standing, a portion of

nitre, formed from the union of the potash and nitric acid is deposited, from which the clear liquor is to be poured off. As this preparation had nearly or altogether fallen into disuse, it is not obvious why it has been restored. No particular advantage is known to belong to it. From the variable state in which it is obtained, from the operation of very trivial circumstances in conducting the process, it must be liable to uncertainty of strength; and it has been stated by the older chemists, that on being kept, it deposits much of the iron,—a change very likely to happen from the metal passing to a higher state of oxidation. It appears therefore to be an injudicious preparation, and there is less necessity for it, as the preparations of iron in the Pharmacopœias are already more numerous than what are required in practice.

HYDRARGYRUS.—QUICKSILVER.

Hydrargyrus purificatus. Purified Quicksilver.

"Take of Quicksilver, four parts; Iron-Filings, one part. Rub them together and distil from an iron vessel." Similar directions are given in the other Pharmacopœias, except that in the Dublin one iron is not ordered, and the distillation of the quicksilver is continued only till three-fourths have passed over.

The quicksilver of commerce has been supposed to be frequently adulterated with other metals. To obtain it perfectly pure is the design of this process. The addition of the iron-filings renders the distilled quicksilver more bright and mobile, an effect not perfectly explained, but ascribed to the iron retaining combined with it any foreign metal, or any portion of carbon that might have been contained in the quicksilver. But the process is in reality not very necessary; for although quicksilver is easily adulterated, this does not appear to be often practised, what is met with in commerce being in gene-

ral nearly pure. The distillation, too, is rather difficult of execution, from the weight of the quicksilver and the high temperature that requires to be applied. Wherever there is reason, however, to suspect any impurity, the purification by this method ought to be performed.

ACETIS HYDRARGYRI. Acetite of Quicksilver. (Acetas Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, three ounces; Diluted Nitrous Acid, four ounces and a half, or a little more than may be requisite to dissolve the quicksilver; Acetite of Potash, three ounces; Boiling water, eight pounds. Mix the quicksilver with the diluted nitrous acid; and towards the end of the effervescence, digest, if necessary, with a gentle heat, until the quicksilver be entirely dissolved. Then dissolve the acetite of potash in the boiling water, and immediately on this solution, while hot, pour the other, and mix them both by agitation. Then put aside, that crystals may be formed. These being placed in a funnel, wash them with cold distilled water; and, lastly, dry them with a very gentle heat.

"In preparing the acetate of quicksilver, it is necessary that all the vessels and the funnel which are employed should be of glass."

Acetic acid, like the other acids, combines with mercury in different states of oxidation, and forms salts which are different in their properties. When the metal is in a high state of oxidation, a salt is formed which is acrid and soluble; when in a lower state of oxidation, the salt obtained is more mild and sparingly soluble. The object of the present process is to obtain the latter of these salts: it may be doubted, therefore, if the application of heat to promote the solution of the mercury is proper, as it causes it, in dissolving, to pass to a too highly oxidated state. It has another disadvantage; that the acid being saturated with oxide, the solution is decomposed by water, and a sub-nitrate is precipitated; and accordingly this happens, when a solution, prepared with the aid of heat, is added to a solution of acetate of

potash. By employing an excess of acid, this is counteracted to a certain extent, and from this circumstance, the process, as given in the Edinburgh Pharmacopœia, may succeed. But by the solution being effected without heat, less acid is required; the process is more economical, and is equally successful, the mild acetate being copiously formed. On mixing the two solutions, the nitric acid of the nitrate of mercury combines with the potash of the acetate of potash, while the acetic acid unites with the oxide of mercury. The acetate of mercury remains at first dissolved, but on the liquid cooling a little, it appears in the form of delicate crystals, of a white colour and silvery lustre. Instead of employing boiling water to dissolve the acetate of potash, it is preferable to use only tepid water, as at a high temperature the water is liable to produce a partial decomposition of the acetate, so that it is of a yellow colour from a slight excess of oxide. It is necessary, too, not to continue to wash the salt after it is formed with much water, for a similar partial decomposition takes place, and the crystals become yellow. If this should happen, the brilliant whiteness is instantly restored by washing them with a little diluted distilled vinegar, the acetic acid neutralizing the excess of oxide to which the yellow colour is owing. With these precautions, the process, which often fails when they are not attended to, is easily conducted, and the preparation obtained perfectly uniform, and in a proper state.

Acetate of mercury crystallizes in small brilliant flakes. It is soluble in hot, and insoluble in cold water. As an antisyphilitic remedy, it is very mild in its operation; but its effects are not considered as sufficiently permanent to allow of its being relied on in effecting a radical cure. Its dose is a grain, night and morning.

MURIAS HYDRARGYRI, *olim Mercurius Sublimatus Corrosivus.* Muriate of Quicksilver. (Oxymurias Hydrargyri, *Ph. Lond.*—Murias Hydrargyri Corrosivum, *Ph. Dub.*)—Murias Hydrargyri Corrosivus. Corrosive Muriate of Mercury.

"Take of Purified Quicksilver, two pounds; Sulphuric Acid, two pounds and a half; Muriate of Soda, dried, four pounds. Boil the quicksilver with the sulphuric acid in a glass vessel placed in a sand-bath, until the matter become dry. Mix this when cold in a glass vessel with the muriate of soda; then sublime it in a glass cucurbit with a heat gradually raised. Separate the sublimed matter from the scoriæ." The same process is given in the other Pharmacopœias, rather a larger quantity of sulphuric acid (three pounds) being ordered by the Dublin College, perhaps with advantage, and a smaller quantity (two pounds and a half) of muriate of soda. If this quantity of muriate of soda is sufficient to afford the quantity of muriatic acid requisite to the saturation of the oxide of mercury in the sulphate, the reduction of it from the larger proportion ordered in the other Pharmacopœias will also be an advantage, as it will render it more easy to apply a due degree of heat in the subliming vessel to the whole mixture.

In the first stage of the process, the sulphuric acid, aided by the high temperature, oxidates the mercury, and combines with the oxide; the salt formed being that which contains the metal in a high state of oxidation. This salt, in its dry state, is mixed with muriate of soda, and, by the application of heat, a double decomposition is effected; the soda attracts the sulphuric acid, and the muriatic acid combines with the oxide of mercury. The muriate of mercury being easily volatilized, is separated from the sulphate of soda by sublimation. The process formerly employed in the preparation of this important mercurial salt, consisted in mixing together sub-nitrate of mercury, muriate of soda, and dried sulphate of iron, and subliming the muriate of mercury, formed by the re-action of these, by the application of a sufficient heat. The present process has been

substituted as more simple, and more economical, from the expense of the nitric acid in preparing the sub-nitrate of mercury being avoided. There is some reason to doubt, however, whether, from a given weight of mercury it affords the same quantity of product; a deficiency arising from the sulphate of mercury not containing a sufficient quantity of acid to decompose as much muriate of soda as is requisite to afford the muriatic acid necessary to convert the whole of the oxide of mercury into muriate. The enlarged proportion of sulphuric acid, and diminished proportion of muriate of soda, directed by the Dublin College, are perhaps in this respect useful.

This mercurial having long been established in medical practice, has been frequently submitted to chemical analysis. The earlier analyses were necessarily incorrect. The investigation of the composition of this and the other muriate of mercury was some years ago undertaken by Mr. Chenevix, and the relative proportions of their principles determined. It had been supposed by some chemists, that it is a compound of oxide of mercury with oxymuriatic acid; this supposition, he found no reason to admit; the compound consisting of mercury in a high state of oxidation united with muriatic acid; the oxide, which is its basis, he concluded, consists of 85 of mercury, and 15 of oxygen; and 100 parts of the salt are composed of 82 of this oxide, and 18 of muriatic acid. Its ultimate principles, therefore, and their proportions, are 18 of acid, 12.3 of oxygen, and 69.7 of quicksilver. Zaboada, from a more recent analysis, has inferred, that the oxide does not contain more than 10 of oxygen in 100 parts, and that 80 of this oxide are combined with 20 of acid. Acording to this, the ultimate principles and their proportions will be 20 of acid, 85 of oxygen, and 71.5 of quicksilver. Some other chemists have given results nearly the same.

The impropriety of the term Oxymuriate of Mercury, given to this salt by the London College, has been pointed out in the observations on the nomenclature of

the metallic salts. Neither is the name Muriate of Mercury, given to it by the Edinburgh College, sufficiently distinctive. In modern chemical writings, this name is even frequently given to the other Muriate of Mercury, in which the metal is at a lower state of oxidation,—a circumstance which must render this as a medical nomenclature extremely hazardous. The name Corrosive Muriate of Mercury is the one which deviates least from the principles on which the system of chemical language is established, and the one which ought to be adopted, considered in relation to its medicinal application, as affording the most marked distinction, and approaching nearest to the appellation by which it has been long known.

Corrosive muriate of mercury is obtained by sublimation in the form of a dense crystalline mass: when sublimed slowly, it condenses in slender prismatic crystals; and it is obtained in a similar form by crystallization from its watery solution. It is easily soluble in water, requiring 20 parts at 60° for its solution, and 2 parts at 212°. It is still more soluble in alkohol, requiring scarcely 4 parts at 60°. Its taste is acrid and metallic. It changes to a green several vegetable colours; is decomposed by the alkalis and earths, and by a number of compound salts, and likewise by vegetable infusions.

It is the most powerful of the mercurial preparations. Its dose cannot safely exceed the fourth of a grain, nor can more than one grain be given in twenty-four hours. As an antisyphilitic remedy it has long been established in practice, and it possesses some advantages. It acts speedily, and its action is more general on the system, or less determined to particular organs: these advantages have led to its frequent use, especially under the form of various empirical remedies, which have been employed in the treatment of syphilis. They are more than counterbalanced, however, by the occasional violence of its operation, and by the uncertainty which attends it, so that it cannot be relied on in establishing a permanent cure. It is given in the form of solution in water or al-

kohol, the dose being increased from the eighth to the fourth of a grain, night and morning, and mucilaginous diluents being freely taken, to lessen the irritation it is liable to occasion. As the solution has a very disagreeable taste, it is sometimes made into pills with crumbs of bread. In other diseases besides lues venerea, it is occasionally exhibited, particularly in cutaneous affections. Externally, its solution is employed as an escharotic in chancre and venereal ulcers of the mouth; and a very dilute solution of it has been used as an injection, to excite inflammation in obstinate gleet.

LIQUOR HYDRARGYRI OXYMURIATIS. Solution of Oxymuriate of Mercury. Pharm. Lond.

"Take of Oxymuriate of Mercury, eight grains; Distilled Water, fifteen fluid ounces; Rectified Spirit, one fluid ounce. Dissolve the oxymuriate in the water, and add the spirit."

This formula is designed to afford a form of prepation under which corrosive muriate of mercury may be administered, and its dose be easily regulated. An ounce contains half a grain; its dose therefore may be from one to two drachms.

SUB-MURIAS HYDRARGYRI, *olim Calomelas*. Sub-muriate of Quicksilver. (Sub-murias Hydrargyri, *Ph. Lond.*—Sub-murias Hydrargyri Sublimatum, *Ph. Dub.*)—Murias Hydrargyri Mitis. Mild Muriate of Mercury.

"Take of Muriate of Quicksilver, rubbed to powder in a glass mortar, four ounces; Purified Quicksilver, three ounces. Rub them together in a glass mortar, with a little water, that the operator may be guarded against the acrid powder which would otherwise arise, until the quicksilver is extinguished. Put the dried powder into an oblong phial, of which it shall fill only one-third, and let it be sublimed in a sand-bath. The sublimation being finished, and the phial broken, the red powder at the bottom and the white one about the neck of it are equally to be rejected; the remaining mass

is to be again sublimed, and rubbed into a fine powder, which is lastly to be washed with boiling distilled water." The directions in the other Pharmacopœias are the same, except that in the London Pharmacopæia the sublimation is ordered to be twice repeated.

This is, perhaps, the most important preparation of mercury, both from the certainty of its operation, its mildness, combined at the same time with sufficient activity, and the numerous indications it is capable of fulfilling. The process, by which it is obtained, too, is one that fortunately is little liable to be varied by circumstances, but affords an uniform product.

The ultimate result of the process, is to bring a quantity of metallic mercury into combination with the principles of corrosive mercury. In the corrosive muriate, the metal exists in a high state of oxidation, and this oxide is combined with a considerable proportion of muriatic acid. The additional proportion of quicksilver, triturated with it, appears to be quickly oxidated, for it soon loses its metallic form, and the whole is converted into a gray powder. By the application of the heat, which is necessary to produce sublimation, the combination is rendered complete; the quicksilver which is added, shares the oxygen of the oxide in the corrosive muriate, and the whole oxide, thus formed, combines with the muriatic acid, which the corrosive muriate contained. It is a general law, with regard to the combinations of acids with metallic oxides, that when the metal is highly oxidated, more acid is required to produce saturation, than when it is in a low state of oxidation. Hence, if the degree of oxidation in any saline metallic compound be reduced, less acid will be necessary to the constitution of the new compound in the neutral state, and this is well displayed in the present combination; for, although the quantity of base is increased, relatively to the acid, yet as this base is also brought into a lower state of oxidation, the portion of acid appears to be sufficient to produce saturation in the new compound; it gives no indication of being a sub-salt, has no tendency to combine

with a larger quantity of acid, nor apparently any power of neutralizing any additional proportion; it is of determinate composition, and is obtained in a crystalline form.

The product then of this process is a muriate of mercury, in which the metal is in a low state of oxidation, and in which this oxide is combined with a small quantity of muriatic acid.

This not inferred merely from the nature of the process by which it is formed, though it is sufficiently established by this; but it is likewise confirmed by its analysis. Mr. Chenevix determined the proportions of its constituent principles, by the same series of experiments by which he investigated the composition of the corrosive muriate. The oxide which is its base, he concluded, is composed of 89.3 of quicksilver, and 10.7 of oxygen; and in 100 parts of it, 88.5 of this oxide are combined with 11.5 of muriatic acid. Its ultimate principles, therefore, are 11.5 of acid, 9.5 of oxygen, and 79 of quicksilver;—proportions of oxygen and acid considerably less than what, according to the experiments of the same chemist, enter into the composition of corrosive muriate of mercury. It has already been stated, that the subsequent experiments of another chemist, Zaboada, afford the result, that less oxygen exists in the composition of the oxide, which is the base of the corrosive muriate, than what is assigned by Chenevix; and the same experiments afford a similar result with regard to the oxide which is the base of the mild muriate; but still they establish the same general difference between these two salts,—that in the mild muriate, or sub-muriate as it is named, the metal is less highly oxidated and the oxide is combined with a less proportion of muriatic acid. According to Zaboada, the oxide in the mild muriate contains little more than 5 of oxygen in 100 parts, and the salt itself is composed of 89.4 of this oxide, with 10.6 of muriatic acid. Its ultimate principles are 10.6 of acid, 4.4 of oxygen, and 85 of quicksilver.

I have already pointed out the impropriety of the

name given by the Colleges to this compound, that of Sub-muriate, which is a violation of the principles on which chemical nomenclature is founded. The compound is not, as the name implies, a Sub-Salt; nor is its relation to the other salt, named Muriate of Mercury, such, that it can by any addition of acid be converted into it. As a medical nomenclature, it is still more objectionable, and the introduction of it is to be regretted, the merely prefixing the syllable *sub* not being sufficient to guard effectually against the dangerous mistake of confounding it with the other, from which it differs so widely. The name, Mild Muriate of Mercury, is under both points of view preferable, as has been already explained; though it will always be safer to prescribe it by the arbitrary name of Calomel, by which it has been long known.

The combination, whence the mild muriate of mercury is formed, is scarcely complete at the first sublimation; a portion of the quicksilver rises on the first application of the heat, and adheres to the portion of muriate condensed on the sides of the vessel, in minute globules; and a small quantity of unchanged corrosive muriate appears also to be diffused through the mass. The white powder mentioned in the formula of the Edinburgh Pharmacopœia, as collected in the neck of the matrass, is corrosive muriate, and is to be rejected; the red powder is oxide of iron, which, when the corrosive muriate is prepared by the medium of sulphate of iron, is diffused through it in minute quantity, but which will not be present when the corrosive muriate is prepared, as is now directed, from sulphate of mercury. To render the combination complete, the sublimed mass is reduced to powder, and is sublimed a second time. The London College order even a third sublimation, and the practice formerly was to sublime it six or seven times. This is, however, altogether unnecessary; and it has even been ascertained, that at each sublimation a little corrosive muriate is re-produced. After the second sublimation, any globules of quicksilver that may adhere to the mass

are removed; it is reduced to a fine powder by trituration and levigation with water, and is well washed with water, until the water pass off tasteless, and, according to a test given by the Dublin College, give no indications of precipitation, from adding a few drops of a solution of carbonate of potash. A method has lately been introduced by Mr. Howard, of conducting the sublimation in an apparatus, so constructed, that the vapours are not condensed in the upper part of the vessel, forming a solid mass, but are condensed on the surface of water. The aggregation, whence a certain degree of ductility and hardness arises that renders difficult the levigation of the sublimate, is thus obviated; it is obtained at once, in the state of a fine powder, and any corrosive muriate that may rise with it is abstracted.

Mild muriate of mercury in its common form is in a dense cake, which is evidently an aggregate of short prisms; and when formed, in particular, by slow sublimation, these are very conspicuous. It is semi-transparent, has a slight yellowish colour, which is liable to be darkened by light, is somewhat ductile and very heavy, its specific gravity being 7.2. It is less volatile than the corrosive muriate; it appears to be altogether insoluble in water; at least Rouelle has stated, that above 1000 parts of water are required for its solution. When pure, it is perfectly insipid.

As a mercurial, this preparation is extensively employed, its operation being sufficiently mild, and, at the same time, certain and active, and its use is only limited by the tendency which it has to occasion purging. As a remedy in syphilis, it is given in the dose of a grain night and morning, its determination to the intestines being prevented, if necessary, by the addition of a little opium. It is the preparation which is most usually given in the other diseases in which mercury is employed, as in affections of the liver or neighbouring organs, in cutaneous diseases, chronic rheumatism, tetanus, hydrophobia, hydrocephalus, and in febrile affections, especially those of warm climates. It is in common use as a

cathartic, either by itself in a dose from five to ten grains, or in a smaller quantity to promote the operation of other purgatives. Its anthelmintic power is justly celebrated. And it is perhaps superior to the other mercurials in assisting the operation of diuretics in dropsy. From its great specific gravity, it ought always to be given in the form of bolus or pill.

SUB-MURIAS HYDRARGYRI PRÆCIPITATUS. Precipitated Sub-muriate of Mercury. (Sub-murias Hydrargyri Præcipitatum. *Ph. Dub.*)

"Take of Diluted Nitrous Acid, Purified Quicksilver, of each eight ounces; Muriate of Soda, four ounces and a half; Boiling Water, eight pounds. Mix the quicksilver with the diluted nitrous acid; and, towards the end of the effervescence, digest with a gentle heat, shaking the vessel frequently. It is necessary, however, that more quicksilver should be mixed with the acid than this can dissolve, that the solution may be obtained fully saturated. Dissolve at the same time the muriate of soda in the boiling water: pour the other solution on this while warm, and mix them quickly together. After the precipitate subsides, pour off the saline liquor, and wash the sub-muriate of mercury, by frequently adding warm water, pouring it off after each time the precipitate subsides, until it come off tasteless." In the Dublin Pharmacopœia, the directions given are nearly the same, seven ounces of quicksilver being digested with five ounces of diluted nitrous acid, for six hours, and the liquor, at the end of this digestion, being made to boil for a short time, then poured off from the undissolved quicksilver, and added to a solution of muriate of soda in warm water.

The design of the process is to obtain mild muriate of mercury, the muriatic acid of the muriate of soda combining with the oxide of mercury, and forming this compound, while the nitric acid of the mercurial solution is saturated by the soda; and the advantages supposed to belong to it are, that it is more easily executed,

less expensive, and affords the product in a much finer powder than that obtained by sublimation can be reduced to. It was introduced on the authority of Scheele, and the directions which are given are those which he pointed out. The theory of metallic solutions was, however, in his time imperfectly understood, and the process to afford the proper product ought to be conducted in a very different manner.

Scheele was evidently misled by the analogy of dissolving a salt in water, the quantity dissolved being increased by heat; and hence, by aiding the action of the acid on the quicksilver by heat, it appeared to follow, that a larger product would be obtained, and that the acid being thoroughly saturated, the product would be more mild. Two circumstances, however, operate in this case, and give rise to other results.

1st, By digesting or boiling the acid on the metal, the decomposition of the acid is facilitated, and the mercury passes to a more highly oxidated state; hence, when the solution is added to the solution of muriate of soda, the degree of oxidation being too great to admit of the whole being converted into mild muriate, a portion of corrosive muriate is always formed. It has been observed, indeed, that although in the first stage of the solution much nitric oxide gas is disengaged, indicating a decomposition of the acid to a considerable extent, yet, that after this, an additional portion of quicksilver is dissolved without much effervescence, whence it has been concluded by some chemists, that this portion must receive oxygen from the portion already dissolved, and that the whole therefore will still exist in a low state of oxidation. The degree of oxidation may perhaps be so far reduced in this manner, but the fact is, that the mercury, in the solution thus prepared, is still too highly oxidated to be converted entirely into mild muriate when combined with muriatic acid; that a portion of it is always converted into corrosive muriate, and that with a solution so prepared, less muriate of mercury is obtained from a given weight of quicksilver, than from a

solution prepared entirely in the cold. I have ascertained this by experiment, the quantity of mild muriate obtained from a solution of one ounce of quicksilver in diluted nitric acid in the cold being a little more than an ounce, while, from the same quantity dissolved with the application of heat, the precipitate did not much exceed half an ounce, while the liquor held dissolved much more corrosive muriate than the other.

2dly, When the solution of the quicksilver in the acid is promoted by heat, the acid is so completely saturated with oxide, that the solution is partially decomposed by mere dilution with water, a quantity of sub-nitrate being precipitated. Hence, when such a solution is mingled with the solution of muriate of soda, this decomposition will take place to a certain extent, from the operation of the water of the solution, and a quantity of this sub-nitrate must be mixed with the mild muriate, and must so far modify its powers.

These sources of error are obviated by using a solution of mercury prepared in the cold, and with a diluted acid; and from such a solution carefully prepared, the product, I have found, is almost entirely mild muriate, with very little corrosive muriate. The method of conducting the process in this manner is to add the quicksilver in small portions at a time to the nitric acid previously diluted with one part and a half of water, (observing the proportions given in the Edinburgh Pharmacopœia), and to avoid altogether the application of heat; when the solution is completed, or no more mercury appears to be capable of being dissolved, a little water is to be added, so as to dissolve any part of the nitrate of mercury that may have crystallized; the clear solution is poured off from the undissolved quicksilver, and is added to the solution of muriate of soda. The precipitate having subsided, is to be carefully washed with water, repeatedly poured on it, to carry off the small quantity of corrosive muriate that is formed. Berthollet has affirmed, however, that even as prepared from a solution of this kind, the precipitate retains in

combination a portion of nitric acid; probably owing to the circumstance that such a solution must always have an excess of acid, part of which the precipitate, as it is formed, may attract. The process ought, on every account, perhaps to be expunged from the Pharmacopœias. It has no advantage, for it is not, as has been supposed, more economical. The fineness of the powder is of little importance, for by levigation the sublimed muriate is obtained sufficiently fine for medicinal use; and the process by sublimation gives a product perfectly uniform, while that by precipitation must always be liable to some uncertainty, from being so much influenced by the manner in which it is conducted. If it is ever followed, much attention should be paid to washing the precipitate thoroughly, so that not the most minute portion of the corrosive muriate may remain mixed with it.

The precipitated mild muriate of mercury is in the state of a smooth powder, whiter, and of much less specific gravity than the muriate prepared by sublimation, differences probably depending on its state of aggregation. When pure, its medicinal operation must be the same. It has been said, from trials that have been made of it, to be more liable to occasion purging. If this difference exists, it is probably owing to the presence either of sub-nitrate of mercury, or of a minute quantity of corrosive muriate.

Oxidum hydrargyri cinereum. Ash-coloured Oxide of Quicksilver. (Pulvis Hydrargyri Cinereus, *Ph. Dub.*)

"Take of Purified Quicksilver, four parts; Diluted Nitrous Acid, five parts; Distilled Water, fifteen parts; Water of Carbonate of Ammonia, as much as may be sufficient. Dissolve the quicksilver in the acid. Add gradually the distilled water. Then pour on as much of the water of carbonate of ammonia as may be sufficient to precipitate the oxide of quicksilver, which is to be afterwards washed with pure water and dried." The directions in the Dublin Pharmacopœia are similar, ex-

cept that the solution of the quicksilver in the acid is promoted by a gentle heat.

The action of ammonia on metallic salts is not perfectly similar to that of the other alkalis. It appears to have a greater tendency to unite with the oxide, and a portion of the acid, so as to form ternary combinations, and from its hydrogen attracting oxygen, it sometimes changes the constitution of the metallic oxide. These actions appear to be modified by the state of oxidation of the metallic salt, and this is well displayed in the effects it produces in the present process on the nitrate of mercury.

If the mercurial solution is in that state in which the metal is highly oxidated, on adding the ammonia, a precipitate is thrown down perfectly white. This was found by Fourcroy to consist of the oxide of mercury, in combination with a portion of acid and of ammonia, its composition, as he determined it, being 68.2 of oxide, 16 of ammonia, and 15.8 of nitric acid. But if the solution contain the metal in a low state of oxidation, the precipitate which is formed is of a dark blue colour approaching to black. This has been supposed to be merely the oxide of mercury that had been combined with the nitric acid, the ammonia combining with the acid, and precipitating the oxide. But an obvious objection to this opinion is, that the precipitate is not the same as that thrown down by potash or soda, but is of a more uniform colour, and darker, a proof that ammonia exerts some peculiar action in its production. According to Fourcroy, who investigated with considerable care these and other saline mercurial combinations, the ammonia, in precipitating the oxide from its combination with the acid, partially de-oxidates it, the hydrogen of a portion of the ammonia attracting part of the oxygen of the oxide, and reducing it to a still lower state of oxidation, approaching nearly indeed to the metallic state: hence there is at the same time a disengagement of a portion of nitrogen gas in consequence of this decomposition of a part of the ammonia, which, when the process is per-

formed in the large way, produces an effervescence, and may be collected.

In frequently performing this process, it has appeared to me that this peculiarity of action by ammonia is exerted only when the mercurial solution contains the metal in a state of oxidation intermediate between the *minimum* and *maximum*. If care has been taken in preparing the solution, so as to have it with the metal dissolved at a very low degree of oxidation, the precipitate thrown down by potash is as dark in its colour as that by ammonia. But if it be somewhat more highly oxidated, that from ammonia is of a much darker colour, and there appears even a film on the surface, with a lustre approaching to metallic. The theory given by Fourcroy, of the operation of the ammonia, is therefore probably just, though I must add, that any effervescence indicating the disengagement of nitrogen gas is extremely slight, and on a small scale is scarcely apparent.

Some chemists have supposed, that the dark gray precipitate contains ammonia. When the precipitate, however, is properly prepared, and thoroughly washed, I have not been able to discover any trace of ammonia in it: when mixed with lime, or with a fixed alkali, no ammonia is exhaled even when heat is applied. If the solution, however, from which the precipitate has been thrown down, has been that in which the metal has been highly oxidated, part of the white triple compound described by Fourcroy will have been formed, and in this case a portion of ammonia is present. In decomposing mercurial solutions accordingly in this state, the precipitate at different stages of the precipitation is various in its colour, being at first gray, and afterwards lighter, and being more or less light as the solution contains the metal more highly oxidated, evidently from the predominance of the white precipitate. But any ammonia derived from this source is foreign to what properly constitutes the gray precipitate.

From the circumstances which influence this preparation not having been fully understood, it has been sup-

posed difficult to obtain it uniform; nor are the directions in the Pharmacopœia sufficiently precise. If the process be properly performed, it may, however, be obtained with certainty always the same. The nitrous acid ought to be diluted with rather more than an equal weight of water, so as to act on the quicksilver slowly, and with scarcely any sensible effervescence; the quicksilver should be added in small quantities at a time, and in as large a quantity ultimately as the acid can dissolve without the application of heat. When the solution appears to have ceased, the liquor is to be poured off from the undissolved quicksilver, and strained; it is to be diluted cautiously with water, as far as the dilution can be carried without impairing its transparency; and water of ammonia is to be added as long as any precipitation is produced. The precipitate is of a very deep gray colour, approaching to black; it is to be washed well with water, and dried. In drying, from exposure to the air and light, its colour becomes lighter; still it is a blue gray. In the shops it is usually of a light gray colour, and sometimes almost perfectly white, from the solution of mercury from which it has been precipitated containing the metal in too highly an oxidated state. The College order carbonate of ammonia to be employed in the precipitation; and it might be supposed from this, that the oxide thrown down will receive carbonic acid, and that the precipitate will be a carbonate or sub-carbonate. This, however, is not the case; the carbonic acid is disengaged, and the same precipitate is thrown down by pure ammonia. Some chemists have supposed, that the precipitate is produced with more certainty of a dark colour, when the ammonia is added in the state of carbonate; but this is a mistake, the darkness of the colour depending entirely on the degree of oxidation of the metal.

The London College have given the same name, Oxydum Hydrargyri Cinereum, to a preparation obtained by a different process, but supposed to be essentially the same. An ounce of Sub-muriate of Quick-

silver (Mild Muriate) is boiled in a gallon of Lime Water, stirring it constantly until the gray oxide of quicksilver subsides. This is washed with distilled water and is then dried.

This process has been had recourse to from the supposed difficulty of obtaining the gray oxide, by precipitation from nitrate of mercury by ammonia, uniform. It will afford a preparation sufficiently uniform, and so far similar to the other, that the oxide is in a low state of oxidation. But it is not at all probable, that the lime can abstract the whole of the muriatic acid, and it is probably, therefore, what is in strictness of nomenclature, a sub-muriate of mercury.

The Gray Oxide of Mercury has been introduced as a substitute for those preparations in which the metal is oxidated by trituration under exposure to the air, and has been supposed to have the advantage of more uniformity of strength, as the others are liable to be variable from imperfect preparation. When properly prepared, it appears to be the same in chemical composition, and the medicinal operation of it is also extremely similar. It is given in the dose of a grain night and morning, usually under the form of pill, and this answers very well as a substitute for the Mercurial Pill. An ointment formed from it, Unguentum Oxidi Hydrargyri Cinerei, has been introduced into the Edinburgh Pharmacopœia; one part of the gray oxide being mixed with three parts of lard. This is designed as a substitute for the Mercurial Ointment, but it has been said not to be so easily forced through the cuticle by friction. It has also been used in the state of vapour from the application of heat, for fumigating venereal ulcers.

Oxidum hydrargyri rubrum per acidum nitricum, *olim Mercurius Præcipitatus Ruber*. Red Oxide of Quicksilver by Nitric Acid. (Hydrargyri Nitrico-Oxydum, *Ph. Lond.*—Oxydum Hydrargyri Nitricum, *Ph. Dub.*)

"Take of Purified Quicksilver, one pound; Diluted Nitrous Acid, sixteen ounces. Dissolve the quicksilver,

and evaporate the solution with a gentle fire to a white dry mass, which being reduced to powder, is to be put into a glass cucurbit, a thick glass plate being put over its surface. Then a capital being adapted, and the vessel placed in sand, apply to it a fire gradually raised, until it pass into very red small scales." The process in the Dublin and London Pharmacopœias is the same, equal weights of diluted nitric acid and quicksilver being ordered in the former, and in the latter a shallow vessel being ordered instead of a cucurbit, and the heat being applied until the powder cease to exhale red vapours.

The quicksilver is in this preparation first oxidated by the nitrous acid, and the oxide then combines with the remaining acid. By the increase of heat, this nitrate is decomposed, and the greater part of the acid expelled, leaving a mass of a deep red colour. From the name of oxide given to this preparation by all the Colleges, it appears to be supposed, that the whole acid of the nitrate is expelled or decomposed, and that the residual matter is quicksilver combined with oxygen alone. This has never been established, however, by any accurate analysis of the preparation, and there are very obvious objections to it. Though a red oxide of mercury can be formed by the action of atmospheric air on the metal at a high temperature, it is quite different in its appearance from the product of the present process: and the latter is possessed of a considerable degree of escharotic power not belonging to the former, communicated probably by a portion of nitric acid combined with it. In all cases where a volatile ingredient is expelled from one more fixed by the application of heat, it is now known that the decomposition is scarcely ever complete, the influence of quantity operating, and causing a portion of the volatile ingredient to be retained, the quantity being greater as there is less difference in the volatility of the two substances. It follows, from this alone, as the most probable conclusion, that although the greater part of the nitric acid may be expelled from the oxide of

mercury, a portion of it will be retained, and it is probably impossible to expel the whole of it, without raising the heat to that point at which the oxygen itself will be expelled, and the quicksilver be reduced to the metallic form. I have accordingly found, that it does contain nitric acid. 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 with carbonate of potash,—a plain proof that it holds dissolved nitrate of mercury; and to avoid any fallacy, the preparation submitted to experiment was that found in the shops, the product of the process on the large scale, of a bright red colour, and more perfectly prepared than that formed on the small scale. This must therefore be regarded as a sub-nitrate, and the proper appellation to be given to it is, Sub-nitras Hydrargyri Ruber, by which also it will be better distinguished from the proper red oxide. According to Payssé, 100 parts decomposed by heat afford 82 of mercury, and 18 of oxygen; this oxygen probably having an intermixture of nitrogen from the decomposition of the acid.

It has always been found very difficult to conduct this process, so as to obtain the product of that bright red colour and scaly appearance which are regarded as tests of its proper preparation. Much of the success depends apparently on the scale on which it is formed, the heat acting more steadily, and with more uniformity, on a large, than on a small quantity. When properly prepared, it is in scales of a bright red colour. It is so acrid as to be altogether unfit for internal administration. Externally it is employed as an escharotic, being applied either in a finely levigated powder, or mixed with lard in the form of ointment. This ointment, composed of one part with eight of lard, is officinal in the Edinburgh Pharmacopœia.

SUB-SULPHAS HYDRARGYRI FLAVUS, *olim Turpethum Minerale*. Yellow Sub-sulphate of Quicksilver. (Oxydum Hydrargyri Sulphuricum, *Ph. Dub.*)

"Take of Purified Quicksilver, four ounces; Sulphuric Acid, six ounces. Put them into a glass cucurbit, and boil in a sand-bath to dryness. The white matter remaining at the bottom of the vessel being reduced to powder, is to be thrown into boiling water. It will thus be converted into a yellow powder, which must be frequently washed with warm water."

By boiling sulphuric acid on quicksilver, the acid suffers a partial decomposition, oxygen being communicated from it to the metal, and sulphurous acid gas disengaged. The oxide of quicksilver is combined with the remaining acid, forming super-sulphate of mercury. By the continuance of the heat, this is partially decomposed, much of the acid is expelled, and a sub-sulphate of mercury remains. On this, boiling water is poured; and it acts as water does on many of the metallic salts. Having a stronger affinity to their acid than to their base, it decomposes the salt, abstracting the acid, and precipitating the oxide; but the influence of quantity on chemical affinity still so far operates in this decomposition, that the acid combined with the water retains a small portion of the oxide combined with it, and the oxide precipitated retains a portion of the acid. The entire compound, therefore, is resolved into a super-salt, which is dissolved, and a sub-salt which is thrown down. This happens in the present process; the water poured on the sulphate of mercury abstracts the acid, retaining in combination with it a portion of oxide, and forming therefore a super-sulphate of mercury, which remains dissolved, while a sub-sulphate is precipitated, and forms the yellow powder. The colour of this is more lively when hot water is used in its preparation, probably from the temperature favouring the chemical action of the water. The success of the process, with regard to the quantity of product, depends much on the sulphate of mercury having been deprived of all free acid previous

to the affusion of the water; for if it contain much acid, the greater part of the salt is dissolved without being decomposed. The proportion of acid ordered in the Pharmacopœia is unnecessarily large, and rather defeats the object of the process; an equal weight is sufficient, and the heat ought to be applied to the saline mass until it is perfectly dry. The super-sulphate dissolved in the water may be decomposed by potash, and a sub-sulphate precipitated.

Yellow sub-sulphate of mercury must, from the nature of the process by which it is obtained, be liable to variation in the proportions of its constituent principles. According to Fourcroy, it consists of 76 of mercury, 11 of oxygen, and 10 of acid, with 3 of water, while another analysis gives the proportion of acid at 15. As a medicine, it is too harsh in its operation to be administered internally, being liable to produce violent vomiting. It has sometimes, however, been given as a powerful emetic, in a dose of five grains. It is an errhine, and has been employed as such, mixed with any mild vegetable powder, in some affections of the eyes.

SULPHURETUM HYDRARGYRI NIGRUM, *olim Æthiops Mineralis.* Black Sulphuret of Quicksilver. (Sulphuretum Hydrargyri Nigrum, *Ph. Dub.*)

"Take of Purified Quicksilver, Sublimed Sulphur, of each equal weights. Rub them together in a glass mortar with a glass pestle, until the globules of quicksilver entirely disappear. It may be made likewise with a double proportion of quicksilver."

By this trituration a chemical combination appears to be effected between the quicksilver and sulphur, as the former loses completely its metallic form, and no globules can be perceived in the powder by the microscope. It has even been supposed, that the metal is at the same time imperfectly oxidated, and combined with sulphuretted hydrogen; but from the researches of Seguin, this does not appear to be the case. The combination is much facilitated by the application of heat, and it can at

once be effected, by adding the quicksilver to the melted sulphur.

This is the least active, perhaps, of the mercurial preparations. As an anthelmintic it is sometimes given in a dose of five or ten grains, and it has been used as an alterative.

Some additional preparations of mercury have a place in the London and Dublin Pharmacopœias, and are used in practice.

Hydrargyrus cum creta. Quicksilver with Chalk. Ph. Lond.

"Take of Purified Quicksilver, three ounces; Prepared Chalk, five ounces. Rub them together until the globules no longer appear."

Quicksilver, when triturated with any substance which aids the division of its globules, and extends their surface, appears to be susceptible of oxidation from the action of the atmospheric air, and the gray oxide formed by this operation is the basis of the common mercurial pill, as well as of some other preparations. More than one preparation of this kind, however, for internal administration, is superfluous; and the mercurial pill, prepared by trituration of the quicksilver with honey, manna, or mucilage, being that which has been long established in practice, is to be preferred. The present preparation has nothing peculiar to recommend it.

Hydrargyrum cum magnesia. Quicksilver with Magnesia. Ph. Dub.

"Take of Quicksilver, Manna, each one ounce; Magnesia, half an ounce. Triturate the quicksilver with the manna in an earthen mortar, adding as much water as will give to the mixture the consistence of syrup, and continuing the trituration until the mercurial globules are so far subdivided as to be no longer visible. Then add to the mixture a drachm of the magnesia, triturat-

ing it constantly. After they are thoroughly mixed together, add a pound of hot water, and shake the mixture; allow the liquor to rest, and pour it off from the sediment which subsides. Repeat this washing twice, that the manna may be entirely removed; and while the sediment is still humid, add to it the remaining magnesia. Lastly, dry the powder on bibulous paper."

The object of this process is to obtain the oxidation of the mercury by trituration, and the interposition of the soft viscous matter of the manna with the addition of the water may facilitate this; the subsequent steps of the operation are designed to remove the manna, and obtain the gray oxide mixed with the magnesia. The same observation, applies, however, to this as to the preceding preparation,—that it is superfluous, and that for any useful purpose the mercurial pill will answer equally well. The only advantage, at least, of either process, is, that it may afford a mild preparation that can be given under the form of bolus, where a pill cannot be easily swallowed.

A preparation is likewise inserted in the Dublin Pharmacopœia, under the name of HYDRARGYRUM CUM CRETA, obtained in the same manner, only substituting precipitated chalk for magnesia.

HYDRARGYRI OXYDUM RUBRUM. Red Oxide of Quicksilver. Ph. Lond. (Oxydum Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, one pound. Put the quicksilver into a glass vessel, with a narrow mouth, and broad at the bottom. Apply heat to this open vessel, raised to the six-hundredth degree, until the quicksilver pass into red scales; then rub these into a fine powder."

At the temperature at which quicksilver boils it combines with oxygen, and when heated to this temperature, under exposure to the air, red scales gadually form on its surface from this combination. There is a difficulty, however, in conducting the process; for if the quicksilver be freely exposed to the air, a considerable quantity

of it is lost, from its vapour being dissipated, especially if the heat be raised a little too high; while, on the other hand, if the air is not freely admitted, the oxidation cannot proceed. The method directed in the formula of the London and Dublin Colleges is the most effectual,—employing a glass vessel broad at the bottom, (so as to present the quicksilver under an extensive surface,) and with a long neck, drawn out to a very small aperture, so that while the atmospheric air is admitted, the mercurial vapour will not so easily escape, the heat being applied by the medium of sand. Still the oxidation goes on very slowly, requiring the application of the heat for several weeks; and from the necessity of keeping up a steady heat without allowing it to become too strong, the conducting of the process requires considerable attention, and the preparation is comparatively high priced.

Red oxide of quicksilver is in scales of a dark brick red colour. When exposed to the heat of ignition it is decomposed, gives out oxygen, and the quicksilver returns to its metallic form. From the quantity of oxygen obtained by the reduction, Lavoisier inferred that the oxide contains seven parts of oxygen in 100 parts. It is a dangerous mistake which some have made, supposing the red scaly substance obtained from the decomposition of nitrate of mercury by heat to be essentially the same. The latter is much more acrid, and cannot be given internally with safety; and it is to be regretted, that the name of Oxide has been given to it, as it may sometimes lead to its substitution for the present preparation.

The red oxide prepared by heat, Calcined Mercury as it was formerly named, is a very active mercurial. It has also been regarded as certain and permanent in its operation, and has therefore sometimes been employed in the treatment of secondary symptoms of syphilis, where the milder mercurials had failed. Its dose is one grain. It is liable, however, to produce irritation on the stomach or intestines, and from this, as well as from its high price, is not very frequently used.

HYDRARGYRUS PRÆCIPITATUS ALBUS. White Precipitate of Mercury. Ph. Lond. (Sub-murias Hydrargyri Ammoniatum, *Ph. Dub.*)

"Take of Oxymuriate of Quicksilver, Muriate of Ammonia, each half a pound; Solution of Sub-carbonate of Potash, half a pint; Distilled Water, four pints. First dissolve the muriate of ammonia, then the oxymuriate of mercury in the distilled water, and add to these the solution of sub-carbonate of potash; wash the powder which is precipitated, until it is free from taste; then dry it."

A process altogether different, but affording precisely the same product, is given by the Dublin College.

"To the liquor which has been poured off from the precipitated sub-muriate of mercury, add as much water of ammonia as is sufficient to precipitate the metallic salt. Wash the precipitate with cold distilled water, and dry it on bibulous paper."

When corrosive muriate of mercury is decomposed by ammonia, a white precipitate is thrown down, consisting of the oxide of the muriate, with portions both of acid and of ammonia combined with it; the proportions, according to Fourcroy's analysis of it, being 81 of oxide, 16 of muriatic acid, and 3 of ammonia. It is this precipitate which is formed in both the above processes. In the first, it may be conceived, that the potash of the sub-carbonate of potash, decomposes the muriate of ammonia, by combining with the muriatic acid, and that the ammonia evolved from this decomposes the muriate of mercury, throwing down the white precipitate the same as when ammonia is added directly to a solution of corrosive muriate; or, what affords a more simple, and perhaps a more just view, the potash attracts the acid, both of the muriate of mercury and muriate of ammonia, and the oxide of mercury is precipitated, retaining a portion of the acid combined with it, and having attracted the quantity of ammonia necessary to the constitution of the ternary compound. The other process, that in the Dublin Pharmacopœia, is simply the

decomposition of corrosive muriate of mercury by ammonia. In the preparation of the mild muriate of mercury by precipitation, it has already been stated, that if a solution of mercury in nitric acid be used, which has been prepared with the application of heat, and which therefore contains the metal more highly oxidated than the *minimum*, a portion of corrosive muriate of mercury is formed, when the solution is decomposed by muriate of soda. It is such a mercurial solution that is ordered in the Dublin Pharmacopœia for the preparation of the precipitated sub-muriate, and hence the liquor from which the precipitate subsides holds corrosive muriate dissolved. When decomposed, therefore, by ammonia, as directed by the present formula, it affords the ternary white precipitate. The name given to this preparation by the Dublin College is preferable to that in the London Pharmacopœia, which is altogether vague. Sub-Murias Hydrargyri et Ammoniæ is probably the correct appellation. The necessity of the presence of ammonia to its constitution is very well shown from the fact, that, if the corrosive muriate be decomposed by potash, it is a yellow precipitate that is thrown down; when it is decomposed by heat, ammonia and nitrogen are evolved.

This precipitate, when dried, forms a light white powder, which is tasteless and insoluble in water. It is used only externally, generally under the form of ointment, in some cutaneous affections.

HYDRARGYRI SULPHURETUM RUBRUM. Red Sulphuret of Quicksilver. Ph. Lond. (Sulphuretum Hydrargyri Rubrum, *Ph. Dub.*)

"Take of Purified Quicksilver, forty ounces; Sublimed Sulphur, eight ounces. To the sulphur melted over the fire, add the quicksilver, and as soon as the mass swells, remove the vessel from the fire, and cover it closely, that inflammation may not take place; then rub it into powder, and sublime." The same directions are given in the Dublin Pharmacopœia.

The inflammation which is taken notice of, as liable

to happen when the melted sulphur and quicksilver are mingled together, is probably not a real combustion, but the evolution of heat and light from their mutual action; this taking place in other cases of the combination of sulphur with metals, and being wholly unconnected, as has been sufficiently established, with any agency of the air. The covering of the vessel will therefore not check it, though the removal of it from the fire may do so, by reducing the temperature, and thus suspending the mutual action of the mercury and sulphur. If this should happen, the combination will probably therefore remain imperfect, and the process may succeed less perfectly, or at least succeed only from the action being renewed in the subsequent sublimation. The exclusion of the air must, however, be proper, as preventing a real combustion taking place, when the mass is so much heated. Different opinions have been maintained with regard to the nature of the ultimate product of this process. Some chemists supposed, that the mercury exists in the state of oxide, in combination with the sulphur, and Vauquelin considered the bright red colour as arising even from a high degree of oxidation; this oxygen being supposed to be combined with the metal in the first stage of the process, when the apparent combustion takes place. This oxygenation, however, has never been clearly established. And according to Proust and Seguin, the compound is a pure sulphuret, consisting of 85 or 86 of quicksilver, with 15 or 14 of sulphur.

This substance, long known by the name of Cinnabar, is of a vivid red colour, which becomes still more bright when it is reduced to powder. Its principal medicinal application is for mercurial fumigation. It is easily volatilized by heat, and its vapour, directed on the surface of venereal ulcers, checks the progress of the ulceration; and where this is of importance, as from the situation of an ulcer it sometimes is, the practice is employed, a little of the powder being laid on a hot iron, and the vapour directed on the part.

PLUMBUM.—LEAD.

ACETIS PLUMBI, *olim Saccharum Saturni.* Acetite of Lead. (Plumbi Super-Acetas, *Ph. Lond.*—Acetas Plumbi, *Ph. Dub.*)

"Take of White Oxide of Lead, any quantity. Put it into a cucurbit, and pour upon it ten times its weight of Distilled Acetous Acid. Let the mixture stand on warm sand until the acid becomes sweet; pour it off, and add a fresh quantity successively, until it cease to acquire sweetness. Then evaporate the whole liquor, freed from impurities, in a glass vessel, to the consistence of thin honey, and put it aside in a cool place, that crystals may form, which are to be dried in the shade. Evaporate the remaining liquor, that there may be a new formation of crystals, and repeat this evaporation until no more are formed." The directions in the Dublin Pharmacopœia are similar. In the London Pharmacopœia, a pound of cerusse is ordered to be boiled in a gallon and a half of vinegar, until the acid is saturated; the liquor is then poured off, and evaporated until a pellicle appear on its surface, when it is put aside to crystallize. The process, however, is never attempted in the shops, but is conducted on a large scale, to furnish the salt for the purposes to which it is applied in the arts; distilled vinegar being either boiled on cerusse until the acid is saturated, or plates of lead being moistened with vinegar, or partially immersed in it, until they are incrusted with oxide, this oxide being dissolved by immersing the plates in the liquor, and a new quantity being formed by raising them to the surface. This is continued until the acid is saturated, and in either case the liquor is brought by evaporation to crystallize.

It is obvious, that in this process the acetic acid of the distilled vinegar combines with the oxide of lead. The salt which crystallizes was supposed to be the neutral acetate; but from more recent researches it appears to be a super-acetate, and this name is accordingly given to it by the London College. The neutral acetate does

not crystallize easily; and it was found by Thenard, whose attention was called to it, from this circumstance, that a slight excess of acid favours the crystallization, and that this excess of acid enters into the composition of the salt. It consists, according to the analysis of it by this chemist, of 58 oxide of lead, 26 acetic acid, and 16 of water, while the neutral salt is composed of 78 of oxide of lead, 17 acetic acid, and 5 of water.

This salt crystallizes in acicular prisms, and as prepared on a large scale, is usually in the form of masses composed of these crystals aggregated; it is white, or of a light yellowish colour, with a silky lustre, is rather efflorescent; it has a sweet taste, whence the name of Sugar of Lead, by which it has been known, this sweetness being accompanied with a degree of astringency. It is soluble in water, requiring about 24 parts at 60° for its solution; with spring water, the solution is milky, from a partial decomposition of the salt, by the minute quantity of sulphates or muriates contained in the water; and even with distilled water the solution is not perfectly transparent, if a large quantity of the water be employed, the water, when its affinity to the acid is aided by its quantity, producing a slight partial decomposition.

Acetate, or rather super-acetate of lead, is employed principally as an external application. Its solution in water is used as a collyrium in ophthalmia, as an astringent injection in gonorrhœa, as a wash in superficial inflammation; and dissolved in vinegar, it is employed as a discutient. These applications of it have already been pointed out under its medical history.

Liquor plumbi acetatis. Solution of Acetate of Lead. Ph. Lond. (Liquor Sub-Acetatis Lithargyri, *Ph. Dub.*)

"Take of the Semi-vitrified Oxide of Lead (Litharge), two pounds four ounces; Acetic Acid (Vinegar), one gallon. Mix them, and boil down to six pounds, stirring constantly; then put the liquor aside, that the impurities may subside, and strain it."

This preparation was introduced by Goulard, a French surgeon, under the name of Extract of Lead, as possessed of peculiar powers, and from the confidence with which it was recommended was established in practice. It was considered by the chemists as a solution merely of oxide of lead in acetic acid, analogous to the crystallized salt. But from the investigation of it by Dr. Bostock, it is proved to have no excess of acid, but to consist of the neutral acetate dissolved in water, and hence the solution is strongly impregnated with oxide of lead. One hundred parts of the saturated solution contain, according to his analysis, 23.1 of oxide, 5 of acetic acid, and 71.9 of water, while 100 parts of the saturated solution of the super-acetate contain 16.8 of oxide, 7.5 of acid, and 75.7 of water. The solution, or Goulard's Extract, as it is named, is of a brown colour. When kept, it becomes lighter, and deposites a quantity of oxide. It is used as a discutient, being mixed with vinegar and water, and frequently applied under the form of cataplasm. It forms also an application to inflamed surfaces, generally under the form of the following preparation, which has been admitted as officinal by the London College.

LIQUOR PLUMBI ACETATIS DILUTUS. Dilute Solution of Acetate of Lead. Ph. Lond.

"Take of Solution of Acetate of Lead, a drachm; Distilled Water, a pint; Proof-Spirit, a fluid drachm. Mix them."

This is what Goulard named absurdly Vegeto-Mineral Water, and which has been highly celebrated as an application in superficial inflammation. It is occasionally employed by surgeons, and some have thought it superior to a simple solution of acetate or super-acetate of lead.

ZINCUM.—ZINC.

CARBONAS ZINCI IMPURUS PRÆPARATUS, *olim Lapis Calaminaris Præparatus.* Prepared Impure Carbonate of Zinc, formerly Prepared Calamine Stone. (Calamina Præparata, Ph. Lond.—Lapis Calaminaris Præparatus, *Ph. Dub.*)

"Procure the Impure Carbonate of Zinc roasted, from those who prepare brass, and let it be prepared in the same manner as Carbonate of Lime."

Calamine is an ore of zinc, the composition of which is variable. Some varieties of it appear to consist of oxide of zinc, combined with siliceous earth; but the more common varieties are composed of the carbonate more or less pure. When calcined by a moderate heat, it becomes friable so as to be more easily reduced to powder; and as this calcination is performed in preparing it for converting copper into brass by cementation, it is ordered in the Pharmacopœia to be obtained in this state, and then to be reduced to a fine powder by levigation, and washing in the same manner as carbonate of lime. Considerable care requires to be taken in this levigation, as the powder is applied to purposes, where, if it were coarse, it would prove irritating. It is used as an application to superficial inflammation and excoriation, dusted on the part, and it forms the basis of the common healing cerate, to which it communicates a degree of consistence and tenacity.

OXIDUM ZINCI IMPURUM PRÆPARATUM, *olim Tutia Præparata.* Prepared Impure Oxide of Zinc, formerly Prepared Tutty. Ph. Ed.

"Let Tutia be prepared in the same manner as Carbonate of Lime."

Tutia is a substance, the origin of which is somewhat doubtful; it consists of oxide of zinc with argillaceous earth; and the most probable account with regard to it is, that it is the sublimate collected in the chimneys in which zinc is calcined, mixed with clay and water, and

baked. It is used externally for the same purposes as calamine, and hence requires to be well levigated.

Oxidum zinci. Oxide of Zinc. (Zinci Oxydum, *Ph. Lond.*—Oxydum Zinci, *Ph. Dub.*)

"Let a large crucible be placed in a furnace filled with burning fuel, in such a manner that it shall be somewhat inclined to its mouth; and, when the bottom of the crucible is at a moderate red heat, throw in a piece of zinc, about the weight of one drachm. The zinc soon inflames, and is converted into white flocculi, which are to be removed, from time to time, from the surface of the metal, with an iron spatula, that the combustion may proceed more perfectly; and, when the inflammation ceases, remove the oxide of zinc from the crucible. Another piece of zinc being thrown in, the operation is to be renewed and repeated as often as may be necessary. Lastly, let the oxide of zinc be prepared in the same manner as carbonate of lime." In the London and Dublin Pharmacopœias, the crucible is directed to be covered with another one inverted over it, but so as to admit the air,—a direction not easily observed, as the zinc requires to be stirred to renew its surface, and keep up the combustion.

Zinc is the most inflammable of the metals. At the temperature of ignition, it attracts the oxygen of the atmospheric air, and burns vividly with a white and green light, producing an oxide in very light flocculi, which are in part carried off by the rapid current of air arising from the burning zinc. This oxide accumulates so rapidly, that it must be withdrawn to allow the combustion to proceed. Particles of metallic zinc are intermingled with it, and hence the necessity of submitting it to levigation. It is light, white, tasteless, and insoluble in water, and contains about 20 of oxygen in 100 parts. In medicine it is employed principally as an antispasmodic in epilepsy and chorea. Its dose is from two to five grains twice a-day, and this gradually increased. It also forms the basis of a healing cerate.

SULPHAS ZINCI, *olim Vitriolum Album.* Sulphate of Zinc. (Zinci Sulphas, *Ph. Lond.*—Sulphas Zinci, *Ph. Dub.*)

"Take of Zinc, cut into small pieces, three ounces; Sulphuric Acid, five ounces; Water, twenty ounces. Mix them, and the effervescence being finished, digest for some time on warm sand. Then strain the liquor through paper; and, after due exhalation, put it aside, that crystals may be formed."

The sulphuric acid in this process, by a resulting affinity, enables the zinc to decompose the water, attracting its oxygen, the hydrogen being disengaged with effervescence: the oxide combines with the acid, forming the sulphate, and by the evaporation this is obtained in acicular crystals. The process, however, is scarcely ever performed in the shops, the sulphate of zinc being prepared on a large scale, from certain varieties of the native sulphuret of the metal. These are roasted, and exposed to air and humidity; oxygen is absorbed, the zinc is oxidated, and the sulphur converted into sulphuric acid; and the sulphate of zinc is extracted by lixiviation. Its solution is evaporated so far, that on cooling, the sulphate of zinc concretes in a granular mass, forming the white vitriol of commerce. It usually contains a little sulphate of iron, and sometimes, it has been supposed, a portion of sulphate of copper and of lead. From the insolubility of the latter salt, it can scarcely be present: the sulphate of copper is scarcely ever to be discovered, and the sulphate of iron is in small quantity, and cannot communicate any injurious quality. And as sulphate of zinc is principally employed externally, the neglect of this process, and the substitution of the common white vitriol, is of less importance.

Sulphate of zinc is used principally as an astringent, in the form of solution; as an injection in gonorrhœa, and a collyrium in ophthalmia: sometimes also internally as an emetic. These applications of it have been already considered.

Solutio sulphatis zinci. 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 water; then the acid being added, strain through paper."

This solution is designed to be used as a collyrium in ophthalmia, the sulphuric acid dissolving any excess of oxide that may be present in the common sulphate of zinc, if it be employed, and coinciding with it in astringency. As an injection in gonorrhœa, the solution, without the acid, is preferable, as sufficiently astringent and less irritating.

Solutio acetitis zinci. Solution of Acetite of Zinc.

"Take of Sulphate of Zinc, one drachm; Distilled Water, ten ounces. Dissolve it. Take also of Acetite of Lead, four scruples; Distilled Water, ten ounces. Dissolve it. Mix the solutions. Let the liquor remain at rest a little; then strain it."

Sulphate of zinc and acetate of lead being the two astringent salts which usually form the basis of the astringent injection employed in gonorrhœa, they had frequently been conjoined in one formula, without the prescriber perhaps being always aware of the decomposition they suffer. The solution, however, was found to answer sufficiently well, being astringent without proving irritating. The use of it led to the introduction of the present process, in which the proportions are properly adjusted. The two salts exchange their principles, the sulphuric acid of the sulphate of zinc combining with the oxide of lead of the acetate of lead, while the acetic acid unites with the oxide of zinc: the sulphate of lead being insoluble, is precipitated, and is removed by filtration; the acetate of zinc remains dissolved.

Tinctura acetatis zinci. Tincture of Acetate of Zinc. Ph. Dub.

"Take of Sulphate of Zinc, one ounce; Acetate of Potash, the same quantity. Triturate them together, and add of Rectified Spirit, one pint. Macerate for a week, agitating the liquor frequently, and strain it through paper."

In this process a similar decomposition takes place, the sulphuric acid of the sulphate of zinc combining with the potash of the acetate of potash, while the acetic acid enters into union with the oxide of zinc. The spirit dissolves the acetate of zinc, while the sulphate of potash remains in a great measure undissolved. The solution is strongly impregnated with the metallic salt, and a collyrium or injection of the usual strength may be prepared extemporaneously, by adding a certain proportion of it to water. The formula appears, however, to have no advantage over the more direct and simple method given by the Edinburgh College.

STANNUM.—TIN.

Pulvis stanni. Powder of Tin. Ph. Dub.

"Take of Tin, any quantity. Having melted it in an iron mortar, agitate it as it cools, until it is reduced to powder, which, when cold, is to be passed through a sieve."

Tin, when heated near to its melting point, becomes extremely brittle, so as to be easily reduced to fragments. When melted, therefore, if stirred or agitated as it becomes solid, this effect is obtained, and a granular powder is formed more easily than by any other method. Its powers as an anthelmintic have been already considered.

ARSENICUM.—ARSENIC.

ARSENICI OXYDUM PRÆPARATUM. Prepared Oxide of Arsenic. Ph. Lond.

"Triturate Oxide of Arsenic into powder; then put it into a crucible, and applying heat, sublime it into another crucible placed over the former."

Oxide of arsenic is usually obtained by sublimation from the ores of cobalt in which it is contained, and which are roasted with the view of obtaining the oxide of cobalt for the purposes to which it is applied in the arts. The arsenical oxide is collected in the chimney and flues of the furnace; it is impure, but is usually purified by sublimation before it is brought to the shops, and is in the state either of a solid cake or a powder. Oxide of arsenic is a substance so very active, that any foreign matter it can contain in this state can be of no importance, and the present process is altogether superfluous. Its properties and medicinal applications have been already considered.

LIQUOR ARSENICALIS. Arsenical Solution. Ph. Lond.

"Take of Prepared Oxide of Arsenic, rubbed to a very fine powder, Sub-carbonate of Potash from Tartar, of each sixty-four grains; Distilled Water, a pint. Boil them together in a glass vessel until the arsenic is entirely dissolved. To the solution when cold, add Compound Spirit of Lavender, four fluid drachms: Then add as much Distilled Water as may be necessary to make up the measure of a pint."

The substance named Oxide of Arsenic has by some chemists been considered as an acid, and named Arsenious Acid. It is not, like the greater number of oxides, insipid and insoluble in water, but has a sharp taste, and is soluble in not more than 80 parts of cold, and 15 of boiling water. It reddens the more delicate vegetable colours, particularly the infusion of litmus, and it combines with the alkalis. The alkaline properties, however,

do not appear to be neutralized in these combinations; and it even neutralizes, as Berthollet affirms, the acids in combining with them. And hence, on the whole, it is to be regarded as an oxide in a high degree of oxidation. By combination with potash it is rendered soluble in water, and to render the solution of it perfect, and obtain it in a form in which its dose can be easily regulated, is the object of the present process. The formula was introduced by Fowler, as giving a substitute for the arsenical preparation known under the name of Tasteless Ague Drop. Each ounce of the solution contains four grains of the oxide. The dose is four drops three times a day, as a remedy in intermittent fever, given with the precautions which have been pointed out under its medical history. The spirit of lavender is designed merely to communicate colour and flavour; but it would have been better to have added some other tincture, the flavour of which is less commonly known, and the taste less grateful, so as to have guarded against the possibility of the solution being incautiously swallowed.

ARSENIAS KALI. Arseniate of Potash. Ph. Dub.

"Take of White Oxide of Arsenic, Nitrate of Potash, each one ounce."

Reduce them separately to powder; mix them, and put the mixture into a glass retort, placed in a sand-bath, and apply heat, raising it gradually until the bottom of the retort is obscurely red. The vapours which arise should, by an apparatus adapted to that purpose, be transmitted through distilled water, that the nitrous acid disengaged by the heat may be condensed. Dissolve the residual matter in four pounds of boiling distilled water, and after due evaporation put it aside, that crystals may form.

Arsenic, by a high degree of oxygenation, acquires unequivocally the properties of an acid. This acid, the Arsenic, as it is named, is formed by distilling nitrous acid from the oxide of arsenic, the nitrous acid yielding

to the oxide the requisite proportion of oxygen. The same change is produced by the present process; the nitrous acid being decomposed, the oxide of arsenic acquiring from it as much oxygen as converts it into arsenic acid, and this acid remaining combined with the potash of the nitre. The residual mass, therefore, when a sufficient degree of heat has been applied to expel or decompose the whole of the nitrous acid, is arseniate of potash. This salt is very soluble in water, and crystallizable. By evaporation of its solution it is obtained in large regular crystals, their figure being a tetraedral prism: in this form, and as obtained by this process, the salt has generally a slight excess of acid: when perfectly neutral, it does not crystallize so easily.

Under this form, as well as under that of the preceding preparation, arsenic has been employed as a remedy in intermittent fever, and in some cutaneous diseases. The dose is from one-sixteenth to one-eighth of a grain of the crystallized salt. It does not appear to have any advantage, however, over the more simple preparation.

CHAPTER XXI.

PULVERES.—POWDERS.

This is the simplest form of composition of medicines, the different articles being merely reduced to powder, and mixed together. It is adapted to the exhibition of such remedies as are not ungrateful, and such as are not liable to lose their virtues by keeping; and is usually an improper form for those which are bitter, acrid or fœtid, which require to be given in a large dose, or which are not easily diffused in water, the vehicle in which powders are usually taken. The dose of a powder seldom exceeds a drachm; and if it require to be given only in a few grains, it is better that

it should be under the form of bolus. When it is to be taken, it is merely diffused in water, wine, or any other convenient vehicle.

PULVIS AROMATICUS. Aromatic Powder. (Pulvis Cinnamomi Compositus, *Ph. Lond.*—Pulvis Aromaticus, *Ph. Dub.*)

"Take of Bark of Cinnamon, Cardamom Seeds, Ginger Root, of each equal parts. Rub them into a very fine powder, which is to be kept in a glass phial well stopt." In the London and Dublin Pharmacopœias the proportion of cinnamon is larger, and a small quantity of long pepper is likewise added.

This combination of aromatics is designed merely to communicate to other compositions fragrance and pungency, and to obviate the nausea which ungrateful medicines are liable to excite. The quantity added to a dose is generally about five grains.

PULVIS ASARI COMPOSITUS. Compound Powder of Asarabacca. (Pulvis Asari Compositus, *Ph. Dub.*)

"Take of the Leaves of Asarabacca, three parts; the Leaves of Marjoram, Flowers of Lavender, of each one part. Rub them together to a powder." In the composition which has a place in the Dublin Pharmacopœia, the leaves of marjoram are omitted.

This is used as a mild errhine, forming the composition known by the name of Herb Snuff. When snuffed in the quantity of a few grains, it occasions sneezing and a discharge of mucus, and is sometimes used in headach and ophthalmia.

PULVIS CARBONATIS CALCIS COMPOSITUS, *olim Pulvis Cretaceus.*

"Take of Prepared Carbonate of Lime, four ounces; Bark of Cinnamon, one drachm and a half; Nutmeg, half a drachm. Rub them together to powder."

This is designed to be used as a grateful antacid. It is given in the dose of one drachm.

PULVIS CRETÆ COMPOSITUS. Compound Powder of Chalk. Ph. Lond.

"Take of Prepared Chalk, half a pound; Bark of Cinnamon, four ounces; Tormentil Root, Gum-Arabic, of each three ounces; Long Pepper, half an ounce. Reduce them separately to powder, and mix them."

This composition, though analogous to the preceding one, is so far different as to require to be noticed apart, the proportion of the aromatics being larger, and the addition of the tormentil root rendering it more astringent. It is used to relieve diarrhœa arising from acidity, being given in the dose of half a drachm or a drachm.

PULVIS CRETÆ COMPOSITUS CUM OPIO. Compound Powder of Chalk with Opium. Ph. Lond.

"Take of Compound Powder of Chalk, six ounces and a half; Hard Opium, rubbed to powder, four scruples. Mix them."

The addition of opium to astringents and antacids, when given in diarrhœa, is a common practice, and this formula affords a convenient composition of this kind. Its dose is one scruple, or half a drachm. Two scruples contain one grain of opium, the proportion having been diminished a little from what it was in former editions of the Pharmacopœia.

PULVIS JALAPÆ COMPOSITUS. Compound Powder of Jalap.

"Take of the Powder of the Root of Jalap, one part; Super-Tartrate of Potash, two parts. Rub them together into a very fine powder."

This combination affords an excellent purgative, less stimulating, and less liable to excite griping than the jalap alone. It is given in the dose of a drachm or a drachm and a half; and in dropsy, as a hydragogue cathartic, to the extent of two drachms.

Pulvis ipecacuanhæ et opii, *olim Pulvis Doveri.* Powder of Ipecacuanha and Opium. (Pulv. Ipecacuanhæ Compositus, *Ph. Lond. Dub.*)

"Take of the Powder of the Root of Ipecacuanha, Opium, of each one part; Sulphate of Potash, eight parts. Rub them together into a fine powder."

This composition, Dover's Powder, has long been established in practice, and is one of those useful combinations, which experience, or rather accident discovers, the powers of which could not have been inferred *à priori* from the known operation of its ingredients. It affords one of the best examples of the power which one medicine has of modifying the action of another, the ipecacuan rendering the operation of the opium, as a sudorific, much more certain than it otherwise would be, and appearing also to diminish its narcotic effect, so that the composition can be given with safety in pure inflammatory affections, in which opium alone would be hazardous. The sulphate of potash serves to divide the particles of the opium and ipecacuan, and mix them more intimately; and such is the advantage derived from it, that, as Dr. Blane has remarked, the opium and ipecacuan alone, mixed in the above proportions, have not the same effect. Hence, too, the operation of the powder is always more certain when it has been triturated to a great degree of fineness. This powder is the most powerful and certain sudorific we possess. Its medium dose is fifteen grains, the operation of which is to be assisted by the sweating regimen; and frequently it is necessary to give additional smaller doses at intervals, to produce sweat. Its principal use is in acute rheumatism; but it is prescribed in all cases with propriety where full sweating is to be induced.

Pulvis opiatus. Opiate Powder.

"Take of Opium, one part; Prepared Carbonate of Lime, nine parts. Rub them together to a fine powder."

This is designed as a convenient form for administer-

ing opium. Ten grains contain a grain of opium, and form a medium dose. It is however little used.

PULVIS CORNU USTI CUM OPIO. Powder of Burnt Hartshorn with Opium. Pharm. Lond.

"Take of Hard Opium rubbed to powder, one drachm; Burnt and Prepared Hartshorn, an ounce; Cochineal in powder, a drachm. Mix them."

This, in the former edition of the Pharmacopœia, had the name of Pulvis Opiatus, which has been changed to its present appellation, as less liable to being confounded with Powder of Opium. A little cochineal is also added to give it colour. The burnt hartshorn serves to divide the opium, and from its hardness and grittiness is better adapted to this than the chalk of the preceding preparation. One grain of opium is contained in ten of the powder.

PULVIS SCAMMONII COMPOSITUS. Compound Powder of Scammony.

"Take of Scammony, Super-Tartrate of Potash, of each equal parts. Rub them together into a very fine powder."

Scammony given alone, is liable to act as a purgative rather with violence, while its operation is at the same time somewhat uncertain. By the addition of the supertartrate of potash, its cathartic operation is rendered more certain and less irritating. It is also preferred to the scammony alone, as a hydragogue cathartic. Its dose is from ten to twenty grains.

PULVIS SCAMMONII COMPOSITUS. Compound Powder of Scammony. Pharm. Lond.

"Take of Scammony, Hard Extract of Jalap, of each two ounces; Ginger, half an ounce. Rub them separately into a very fine powder, then mix them."

This composition, though under the same name as the preceding one, is of a very different nature; the sti-

mulating operation of the scammony not being corrected, but rather increased by the addition of the extract of jalap. The ginger will communicate an aromatic pungency, and obviate griping. The compound is a strong cathartic. Its medium dose is ten or fifteen grains.

PULVIS SULPHATIS ALUMINÆ COMPOSITUS, *olim Pulvis Styptieus.* Compound Powder of Sulphate of Argil.

"Take of Sulphate of Alumine, four parts; Kino, one part. Rub them together into a fine powder."

This being a combination of two powerful astringents, has been sometimes used internally in menorrhagia, in repeated doses of ten or fifteen grains, and externally as a styptic application to bleeding wounds.

THE following Powders have a place in the London or Dublin Pharmacopœia, without any preparations corresponding to them in the Pharmacopœia of the Edinburgh College.

PULVIS ALOES COMPOSITUS. Compound Powder of Aloes. Ph. Lond.—(Pulvis Aloes cum Guaiaco, *Ph. Dub.*)

"Take of Socotorine Aloes, one ounce and a half; Guaiac Gum-Resin, one ounce; Compound Powder of Cinnamon, half an ounce. Rub the aloes and guaiac separately into powder; then mix them with the compound powder of cinnamon."

This combination of aloes with guaiac is designed as a stimulating aperient, and may be given in a dose of fifteen or twenty grains. The form of powder is however very ill adapted to the exhibition of a substance so bitter and nauseous as aloes, or of resinous substances, such as guaiac; and the composition is therefore little used.

PULVIS ALOES CUM CANELLA. Powder of Aloes with Canella. Ph. Dub.

"Take of Hepatic Aloes, one pound; White Canella, three ounces. Rub them separately to powder; then mix them."

This had a place in the former edition of the London Pharmacopœia, but is now thrown out. The canella covers the unpleasant flavour of the aloes; and this combination is sometimes used as a warm stimulating cathartic, not under the form of powder, but made into a tincture, by infusing it in spirit. A composition of this kind, designed for this purpose, has long been kept in the shops, under the name of Hiera Picra.

PULVIS CONTRAYERVÆ COMPOSITUS. Compound Powder of Contrayerva. Ph. Lond.

"Take of Contrayerva Root, rubbed to powder, five ounces; Prepared Shells, one pound and a half. Mix them."

This is a composition which has long kept its place in the Pharmacopœias, and has been frequently reformed. It is one scarcely adapted to any important purpose, or possessed of any advantage. It has been given as a tonic and stimulating diaphoretic, in a dose of half a drachm, or two scruples.

PULVIS KINO COMPOSITUS. Compound Powder of Kino. Pharm. Lond.

"Take of Kino, fifteen drachms; Cinnamon Bark, half an ounce; Hard Opium, a drachm. Triturate them separately into a very fine powder, then mix them."

Kino is one of the most powerful vegetable astringents. The cinnamon will communicate to it a grateful aromatic flavour and pungency, and the addition of the opium will render it a more powerful remedy in diarrhœa. Yet the form of powder does not appear to be well adapted to its administration; nor does there appear any particular reason for introducing this as an officinal

preparation. One part of opium is contained in twenty, and it may be given in a dose from ten to twenty grains.

PULVIS SENNÆ COMPOSITUS. Compound Powder of Senna. Pharm. Lond.

"Take of Leaves of Senna, Super-Tartrate of Potash, of each two ounces; Scammony, half an ounce; Ginger, two drachms. Rub the scammony separately, the others together, into a fine powder, and mix them."

This may be employed as a purgative, in a dose of from half a drachm to a drachm. The senna is, however, a substance so inferior in power to the scammony, that there appears to be little advantage in their combination, nor is the form of powder well adapted to their exhibition.

PULVIS TRAGACANTHÆ COMPOSITUS. Compound Powder of Tragacanth. Pharm. Lond.

"Take of Tragacanth, rubbed to powder, Gum Arabic in powder, Starch, of each one ounce and a half; Refined Sugar, three ounces. Triturate the starch and sugar together into powder, then having added the tragacanth and the gum Arabic, mix them all together."

This combination of mucilaginous substances may be employed for the general purposes of demulcents, in the dose of a drachm, or two drachms, frequently repeated. But it appears to be a very superfluous composition.

CHAPTER XXII.

ELECTUARIA.—ELECTUARIES.

THIS term is applied to that form of compound medicines where the consistence is nearly that of thick honey. An electuary is composed, in general, of a powder reduced to the proper consistence by the addition

of syrup or mucilage. It is a proper form for administering medicines which are not very disagreeable in their taste or flavour; and, except in a few officinal preparations, it is an extemporaneous prescription, as when long kept it is liable to become too thick and adhesive from the evaporation of part of its moisture. Dry powders generally require twice their weight of syrup to bring them to the due consistence; and syrup is preferable to mucilage, as the electuary made with the former does not so soon become dry. The common dose of an electuary rarely exceeds two tea-spoonfuls, and is seldom less than a tea-spoonful; any very active medicine, which requires to be given in a smaller dose, being usually administered under the form of bolus.

The London College have united the Electuaries with the Conserves, as they are both compositions of vegetable matter with sugar, and are of similar consistence; and have given to them the common name of Confections. In conserves, however, 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. The Edinburgh College retain the distinction of conserves, and the individual preparations which have this name have been already considered.

ELECTUARIUM AROMATICUM. Aromatic Electuary. (Confectio Aromatica, *Ph. Lond.*—Electuarium Aromaticum, *Ph. Dub.*)

"Take of Aromatic Powder, one part; Syrup of Orange-Peel, two parts. Mix, beating them well together, so as to form an electuary." The composition which has a place in the other Pharmacopœias is somewhat different. The following is the formula given by the London College: "Take of Cinnamon Bark, Nutmegs, each two ounces; Cloves, one ounce; Cardamom Seeds, half an ounce; Saffron dried, two ounces; Prepared Shells, sixteen ounces; Refined Sugar, two pounds; Water, a pint. Triturate the dry substances together

into a fine powder, then add the water gradually, and mix them so as to form an uniform mass."

The composition of the Edinburgh Pharmacopœia is the more simple of these; and in that of the London Pharmacopœia, the carbonate of lime is foreign to the object of the combination, though, as it has long had a place, it is still retained. Either electuary is a grateful aromatic preparation, frequently combined with other medicines, or made the basis of cordial or carminative mixtures, requiring merely for this purpose to be diffused in water with a little syrup.

ELECTUARIUM CASSIÆ FISTULÆ. Electuary of Purging Cassia. (Confectio Cassiæ, *Ph. Lond.*—Electuarium Cassiæ, *Ph. Dub.*)

"Take of the Pulp of Cassia in pods, four parts; Pulp of Tamarinds, Manna, of each one part; Syrup of Pale Rose, four parts. Dissolve the manna beat in a mortar, with a gentle heat, in the syrup; then add the pulps, and, by a continued heat, reduce the mixture to a proper consistence." The composition with regard to the ingredients is the same in the other Pharmacopœias.

This electuary affords a mild laxative, which operates in the dose of an ounce. From the predominance of the pulps and the saccharine matter, it is liable, however, to become sour on keeping; it is also inferior in activity to the next electuary, which is equally pleasant, and hence, it is so little used, that it is never found in the shops.

ELECTUARIUM CASSIÆ SENNÆ, *olim Electuarium Lenitivum.* Electuary of Senna. (Confectio Sennæ, *Ph. Lond.*—Electuarium Sennæ, *Ph. Dub.*)

"Take of the Leaves of Senna, eight ounces; Coriander Seeds, four ounces; Liquorice Root, three ounces; Figs, Pulp of Prunes, of each one pound; Pulp of Tamarinds, half a pound; Refined Sugar, two pounds and a half. Bruise the senna with the coriander seeds, and separate by passing through a sieve ten ounces of the mixed powder. Boil the residuum with the figs and

the liquorice in four pounds of water to one half; then express and strain. Reduce the strained liquor, by evaporation, to about a pound and a half. Afterwards add the sugar, so as to make a syrup. Add this syrup gradually to the pulps, and, lastly, mix in the powder." The composition in the London Pharmacopœia is the same, with the addition of half a pound of Pulp of Cassia. In the Dublin Pharmacopœia it is different; the ingredients being, Senna Leaves in fine powder, four ounces; Pulp of Prunes, a pound; Pulp of Tamarinds, two ounces; Syrup of Brown Sugar (Molasses), a pint and a half; Essential Oil of Carraway, two drachms.

This electuary is in very common use as a mild and pleasant purgative. Its dose is six drachms, or an ounce; and it is sometimes rendered more active by the addition of a little jalap, or super-tartrate of potash. The electuary of the Dublin Pharmacopœia, though more simple than the others, must be less grateful, from containing so large a proportion of molasses; and the oil of carraway will communicate rather too much pungency to a medicine in this form.

ELECTUARIUM MIMOSÆ CATECHU, *olim Confectio Japonica.* Electuary of Catechu. (Electuarium Catechu Compositum, *Ph. Dub.*)

"Take of Extract of Catechu, four ounces; Kino, three ounces; Bark of Cinnamon, Nutmeg, of each one ounce; Opium, diffused in a sufficient quantity of Spanish White Wine, one drachm and a half; Syrup of Red Rose, boiled to the consistence of honey, two pounds and a quarter. Reduce the solid ingredients to powder, and, mixing with them the opium and syrup, form an electuary." In the Dublin Pharmacopœia, the nutmeg is omitted, the quantity of cinnamon being proportionally increased, and the Syrup of Ginger is substituted for Syrup of Rose: the proportion of opium is the same.

In this electuary, the more powerful vegetable astringents are combined; they are rendered more grateful by

the addition of the aromatics, and the efficacy of the composition, as a remedy in diarrhœa, is increased by the opium. It is the basis of the common extemporaneous astringent mixture; two drachms of it being diffused with a little syrup in six ounces of water, and a table spoonful of this being taken three or four times a day. One grain of opium is contained in rather more than three drachms.

ELECTUARIUM OPIATUM, *olim Electuarium Thebaicum.* Opiate Electuary. (Confectio Opii, *Ph. Lond.*)

"Take of Aromatic Powder, six ounces; Virginian Snake-root, rubbed to a fine powder, three ounces; Opium diffused in a sufficient quantity of Spanish White Wine, half an ounce; Syrup of Ginger, one pound. Mix, so as to form an electuary." The formula in the London Pharmacopœia is somewhat different from this. It prescribes of "Hard Opium, rubbed to powder, six drachms; Long Pepper, an ounce; Ginger-root, two ounces; Carraway Seeds, three ounces; Syrup, a pint. Triturate the opium with the syrup heated, then add the other ingredients ground to powder, and mix them."

This is a substitute for compositions once highly celebrated, and which have long kept their place in the Pharmacopœias of Europe, the Mithridate and Theriaca, and which at one period consisted of above an hundred ingredients. Opium appeared, amid this farrago, to be the ingredient of predominating power, modified principally by aromatics; they have been, therefore, gradually reformed into the present preparation, and even it is scarcely used. Each drachm, prepared according to the formula in the Edinburgh Pharmacopœia, contains a grain and a half of opium; and rather more in that prepared by the prescription of the London College, thirty-six grains of the latter containing one grain.

It remains to take notice of those Electuaries or Confections as they are named, which are peculiar to the London Pharmacopœia.

Confectio amygdalæ. Almond Confection.

"Take of Sweet Almonds, an ounce; Gum Arabic in powder, a drachm; Refined Sugar, half an ounce. The almonds having been previously macerated in water, and their external pellicle removed, beat the whole together, until they form an uniform mass." This is introduced as affording an easy and convenient mode of preparing the almond emulsion extemporaneously; a little of this confection forming it by diffusion in water.

Confectio rutæ. Confection of Rue.

"Take of the Dried Leaves of Rue, Carraway Seeds, Bay Berries, of each an ounce and a half; Sagapenum, half an ounce; Black Pepper, two drachms; Clarified Honey, sixteen ounces. Triturate the dry ingredients into a fine powder; then having added the honey, mix them all together."

This is intended merely as the basis of a moderately stimulating enema, sometimes given in the hysteric paroxysm, and in flatulent colic.

Confectio scammoniæ. Confection of Scammony, *Ph. Lond.* (Electuarium Scammonii, *Ph. Dub.*)

"Take of Scammony Powder, an ounce and a half; Cloves, bruised, Ginger-Root in powder, of each six drachms; Oil of Carraway, half a fluid drachm; Syrup of Rose, as much as may be necessary. Triturate the dry substances into a very fine powder; then having added the syrup, rub them again; and, adding the oil of carraway, mix them together." The composition in the Dublin Pharmacopœia is nearly the same, the cloves

being omitted, and their oil added instead of oil of carraway.

This is a stimulating cathartic, not very frequently employed. It is given in a dose of from half a drachm to a drachm.

CHAPTER XXIII.

PILULÆ.—PILLS.

Pills are formed from a mass sufficiently stiff and adhesive to preserve the round form which is given to them. Under this form, such medicines are generally exhibited as are nauseous, either in taste or flavour, and such as operate in a small dose. Few general rules require to be given with regard to their formation. Such of the ingredients as are capable of being reduced to powder, are first triturated to the requisite fineness; those which are of a softer consistence are then added, and if this is not sufficient to bring the whole to a proper consistence, a small quantity of syrup or mucilage is to be added; the former is preferable, as the latter, in drying, is liable to render the mass too hard. Some substances, as several of the gum-resins, become soft on beating, so as to form into pills. Light vegetable powders, when beat up with syrup, form a mass which is not sufficiently coherent to roll out. In this case it is necessary to add a small quantity of pure soap, which gives the necessary tenacity. Metallic preparations, which are heavy, and given in a small dose, are made into pills by the addition of some extract or conserve. If the pill mass is too soft, so that the pills, after being formed, do not keep their form, it may be made harder by the addition of a small quantity of any inactive vegetable matter, as powder of liquorice. After they are rolled out, they must, to prevent them from adhering,

be covered with the same powder, or, what is preferable, as less liable to become mouldy, starch or carbonate of magnesia. A pill ought not to exceed five grains in weight, or twelve may be formed from a drachm of the mass. They ought not to be prepared in too large a quantity at a time, as if long kept they become so hard as to be scarcely acted on in the stomach.

PILULÆ ALOETICÆ. Aloëtic Pills.

"Take of Socotorine Aloes reduced to powder, Soap, of each equal weights. Beat them with Simple Syrup, so as to make a mass fit for pills."

PILULÆ ALOES COMPOSITÆ. Compound Aloes Pills. Pharm. Lond.

"Take of Socotorine Aloes, in powder, one ounce; Extract of Gentian, half an ounce; Oil of Carraway, forty minims; Syrup, as much as necessary. Beat them together until they form a mass."

In this formula the proportion of extract of gentian is too large, the mass being too soft to form properly into pills. It affords a convenient form for the exhibition of aloes, and is in common use as a purgative. Its medium dose is 10 or 15 grains.

Under either of these simple forms aloes is very commonly exhibited as a cathartic. Two pills are a medium dose.

PILULÆ ALOES CUM ZINGIBERE. Pills of Aloes with Ginger. Ph. Dub.

"Take of Hepatic Aloes, one ounce; Ginger-Root in powder, one drachm; Spanish Soap, half an ounce; Essential Oil of Peppermint, half a drachm. Triturate the aloes with the ginger to powder; add the soap and essential oil, and form the whole into one mass."

This composition is adapted to the same purposes as the preceeding pill, the essential oil communicating some aromatic flavour and pungency. Their dose is the same.

PILULÆ ALOES ET ASSAFOETIDÆ. 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."

These pills are occasionally employed in amenorrhœa, hysteria, in dyspepsia attended with flatulence, and in tympanitis, two or three being taken at bedtime. They will at least prove useful by obviating costiveness.

PILULÆ ALOES CUM COLOCYNTHIDE. Pills of Aloes with Colocynth.

"Take of Socotorine Aloes, Scammony, of each eight parts; Colocynth, four parts; Sulphate of Potash with Sulphur, Oil of Cloves, of each one part. Let the aloes and scammony be reduced, with the salt, to powder; then let the colocynth, rubbed into a fine powder, and the oil, be added. Lastly, beat them with mucilage of gum Arabic into a mass."

PILULÆ COLOCYNTHIDIS COMPOSITÆ. Compound Colocynth Pills. Ph. Dub.

"Take of Colocynth, half an ounce; Hepatic Aloes, Scammony, of each an ounce; Spanish Soap, two drachms; Oil of Cloves, one drachm. Reduce the aloes, scammony, and colocynth, separately to powder; then beat them together with the oil and soap, with the addition of the syrup, into a mass."

These compositions are of similar powers. They afford a stronger cathartic than the simple aloëtic pill, and accordingly this compound pill is used in constipation, or to obviate habitual costiveness. Two pills are a common dose.

PILULÆ ALOES ET MYRRHÆ. Pills of Aloes and Myrrh. (Pilulæ Aloes cum Myrrh. *Ph. Lond. Dub.*)

"Take of Socotorine Aloes, four parts; Myrrh, two parts; Saffron, one part. Beat them into a mass with

Simple Syrup." In the formula of the London College, the proportion of saffron is equal to two parts. In that of the Dublin Pharmacopœia, a little oil of carraway is added.

These pills, under the name of Rufus's Pills, have long been in use, as affording a moderately stimulating cathartic, useful in dyspepsia connected with costiveness; sometimes used also in hypochondriasis, hysteria, and in jaundice. Their dose is ten or fifteen grains.

PILULÆ AMMONIARETI CUPRI. Pills of Ammoniuret of Copper.

"Take of Ammoniuret of Copper, rubbed into fine powder, sixteen grains; Crumb of Bread, four scruples; Water of Carbonate of Ammonia, as much as may be sufficient. Beat them into a mass, which divide into thirty-two equal pills."

It is under this form that ammoniuret of copper is given in epilepsy and the other spasmodic diseases in which it has been employed. Half a grain of it is contained in each pill. One pill is given at first, night and morning, and the dose is gradually increased, as far as the stomach and general system will bear it, until a cure is obtained, or the remedy has received a fair trial.

PILULÆ ASSÆ FOETIDÆ COMPOSITÆ. Compound Assafœtida Pills.

"Take of Assafœtida, Galbanum, Myrrh, of each eight parts; Rectified Oil of Amber, one part. Beat them into a mass with Simple Syrup."

These pills afford a stimulating aperient, and fœtid antispasmodic, used in hysteria and amenorrhœa, two or three of them being taken at bedtime.

PILULÆ GALBANI COMPOSITÆ. Compound Pills of Galbanum. Pharm. Lond.

"Take of Galbanum, an ounce; Myrrh, Sagapenum, of each one ounce and a half; Assafœtida, half an ounce; Syrup, as much as may be sufficient. Beat them together, and form a mass."

PILULÆ MYRRHÆ COMPOSITÆ. Compound Pills of Myrrh. Ph. Dub.

"Take of Assafœtida, Galbanum, Myrrh, in powder, of each one ounce; Oil of Amber, half a drachm. Triturate them together, and form them into a mass with Simple Syrup."

These compositions, though under different names, are similar to the preceding one. They all form a substitute for the Gum Pills of the older Pharmacopœias. They are used in the same cases, and in the same dose.

PILULÆ HYDRARGYRI. Mercurial Pill. (Pilulæ Hydrargyri, *Ph. Lond. Dub.*)

"Take of Purified Quicksilver, Conserve of Red Rose, of each one ounce; Starch, two ounces. Rub the quicksilver with the conserve, in a glass mortar, until the globules entirely disappear, adding, as there may be occasion, a little mucilage of gum Arabic; then add the starch, and beat, with a little water, into a mass, which is to be immediately divided into four hundred and eighty pills." The formula in the London and Dublin Pharmacopœias is a little different from this. It prescribes "of Purified Quicksilver, two drachms; Conserve of Red Rose, three drachms; Liquorice Root in powder, one drachm. Rub the quicksilver with the conserve until the globules no longer appear, then adding the liquorice powder, beat the whole together so as to form a mass." A grain of mercury is contained in four grains of the mass, prepared according to the formula of the Edinburgh College, and in three grains according to the other.

The trituration of the quicksilver in this preparation was formerly believed to reduce it merely to a state of extreme mechanical division. But there is every reason to believe that an oxidation of the metal is effected, and that the medicinal efficacy of the preparation depends on this oxide. Quicksilver, in its metallic state, being entirely inert with regard to the living system, the activity

of the preparation itself is a presumption of this; but it is farther known, that by agitation with atmospheric air, quicksilver affords a portion of a gray powder, soluble in muriatic acid, and which must therefore be regarded as an oxide, metallic quicksilver being insoluble in that acid. This oxidation must be effected more readily when the surface of the metal is extended, and its continuity is divided by the interposition of any viscous matter, and hence the advantage derived from the trituration of it with substances of this kind, in the preparation of the mercurial pill. Different substances have been employed, syrup, mucilage, honey and others. The Colleges have now agreed in preferring the Conserve of Rose, it having been supposed that this is superior to the others in facilitating the operation. Much attention is requisite that the trituration be continued until the extinction is completed, as on this the efficacy of the pill depends. This is known by rendering the matter a little thinner by the addition of a little water, and extending it by rubbing on a glass plate or on paper, when the globules, if any remain, will be apparent. Starch has been selected by the Edinburgh College to form it into a mass, and is preferable to liquorice powder, as not being liable to become mouldy.

This pill is the preparation of mercury that is upon the whole most generally used for obtaining the general action of this metal on the system; and while it is milder in its operation than some others, and has less determination to the intestinal canal, it is sufficiently active and certain. The common dose, given with the view of inducing the usual mercurial action, is two pills at bed-time and one in the morning, which, in particular cases and habits, requires to be increased. Four or six pills given at once generally excite purging.

PILULÆ OPIATÆ, *olim Pilulæ Thebaicæ.* Opiate Pills.

"Take of Opium, one part; Extract of Liquorice, seven parts; Jamaica Pepper, two parts. Mix the opium

and the extract separately, softened with diluted alkohol, and beat them into a pulp; then add the Jamaica pepper rubbed to powder, and, beating them well, reduce them to a mass."

PILULÆ SAPONIS CUM OPIO. Pills of Soap with Opium. Ph. Lond.

"Take of Hard Opium, rubbed to powder, half an ounce; Hard Soap, two ounces. Beat them together, until they form one mass."

PILULÆ E STYRACE. Pills of Storax. Pharm. Dub.

"Take of Purified Storax, three drachms; Soft Purified Opium, one drachm; Saffron, the same weight. Beat them together, mixing them thoroughly."

The articles which in these compositions are added to the opium, cannot be supposed to have any important effect on its operation; they serve merely to disguise it; and where it is necessary, which it occasionally is, to conceal the administration of opium from the patient, they afford convenient forms. Even the name sometimes requires to be concealed in a prescription; and hence the reason of the names given by the London and Dublin Colleges being derived from the trivial ingredients. It is only to be regretted, that the proportion of opium is not the same in all of them. Two pills, or ten grains of the pill of the Edinburgh Pharmacopœia, contain one grain of opium; while in the formula of the London and Dublin Colleges, the proportion of opium is larger, five grains or one pill containing one grain.

PILULÆ RHEI COMPOSITÆ. Compound Pills of Rhubarb.

"Take of the Root of Rhubarb, in powder, one ounce; Socotorine Aloes, six drachms; Myrrh, half an ounce; Oil of Peppermint, half a drachm. Beat them into a mass with syrup of orange-peel."

This is a moderate laxative much employed, especially in dyspeptic affections, to obviate costiveness, and

stimulate gently the stomach and intestines. Two pills are taken at bed-time, and operate in general without occasioning any irritation, evacuating the contents of the intestines, without producing purging.

PILULÆ SCILLITICÆ. Squill Pills.

"Take of the dried Root of Squill, rubbed to a fine powder, one scruple; Gum-Ammoniac, Cardamom Seeds, in powder, Extract of Liquorice, of each one drachm. Beat them with simple syrup into a mass."

PILULÆ SCILLÆ COMPOSITÆ. Compound Squill Pills. Ph. Lond.

"Take of the Root of Squill, recently dried, and beat to powder, a drachm; Ginger Root, in powder, Hard Soap, of each three drachms; Gum-Ammoniac in powder, two drachms. Mix the powders together; then beat them with the soap, adding as much syrup as may be sufficient to give the due consistence."

PILULÆ SCILLÆ CUM ZINGIBERE. Pills of Squill with Ginger.

"Take of Squill Root in powder, one drachm; Ginger Root in powder, two drachms; Essential Oil of Anise, ten drops. Triturate them together, and form them into a mass by the addition of soap jelly."

Under the form of these compositions, which have long been officinal, and which do not differ materially from each other, squill is often given as an expectorant in dyspnœa and chronic catarrh, two pills being taken morning and evening. Any efficacy they have depends on the squill. But there appears to be no advantage in reducing so much its activity by the addition of so large a proportion of other matter; and as squill, when long kept, is liable to have its strength impaired, it is perhaps preferable that it should be given under some form of extemporaneous preparation.

There are a few officinal Pills peculiar to the London Pharmacopœia.

Pilulæ gambogiæ compositæ. Compound Gamboge Pills.

"Take of Gamboge in powder, Socotorine Aloes in powder, Compound Powder of Cinnamon, of each one drachm; Soap, two drachms. Mix the powders together, then, adding the soap, beat the whole into one mass."

By the addition of the gamboge to the aloes, its cathartic power is increased, and a composition afforded, more active than the aloëtic pill. Two or three pills are a dose.

Pilulæ ferri cum myrrha. Pills of Iron with Myrrh.

"Take of Myrrh, beat to powder, two drachms; Sub-carbonate of Soda, Sulphate of Iron, Sugar, of each a drachm. Triturate the myrrh with the sub-carbonate of soda; then having added the sulphate of iron, triturate them again; lastly, beat the whole together, until they form an uniform mass."

This is the same composition, with regard to the active ingredients, as forms the basis of the compound mixture of iron, the substitute for Griffith's mixture, and it may be occasionally convenient to prescribe it under the form of pill, or to form the mixture from it extemporaneously by diffusion in water. The ingredients, however, are not very well adapted to preserve this form.

Pilulæ hydrargyri sub-muriatis. Pills of Sub-muriate of Quicksilver.

"Take of Sub-muriate of Quicksilver, Precipitated Sulphuret of Antimony, of each a drachm; Gum-resin of Guaiac, beat to powder, two drachms. Triturate the sub-muriate of quicksilver with the precipitated sulphuret of antimony, then with the gum-resin of guaiac, and add of copaiba as much as may be sufficient to give the proper consistence.

This composition of Calomel, and what is named Precipitated Sulphuret of Antimony, was introduced by Dr. Plummer as an alterative, employed more particularly in cutaneous affections. The pills, under his name, had a place in the Pharmacopœias, and though expunged, they have been restored by the London College, as occasionally used in practice.

CHAPTER XXIV.

TROCHISCI.—TROCHES.

Troches, or Lozenges, consist of powders mixed with mucilage, in such a proportion, that when dried they are firm and hard. While in the state of a soft paste, they are cut into small square or round tablets, and these are hardened by drying. The form is one adapted principally to such medicines as are designed to dissolve slowly in the mouth; and hence they are always rendered pleasant by the addition of a large proportion of sugar. They are seldom active remedies, but are employed principally in affections of the mouth or throat. As of little importance, they have been rejected in the Dublin and in the late edition of the London Pharmacopœia, and a few only are retained by the Edinburgh College.

Trochisci carbonatis calcis. Troches of Carbonate of Lime.

"Take of Prepared Carbonate of Lime, four ounces; Gum Arabic, one ounce; Nutmeg, one drachm; Refined Sugar, six ounces. Rub these to powder, and make them into a mass with water, fit for forming troches."

This is a pleasant form under which carbonate of lime may be given as an antacid, though the quantity

of saccharine matter may perhaps rather favour the production of acid in the stomach; and either from this, or from not being well prepared in the shops, they are little used.

TROCHISCI GLYCYRRHIZÆ. Liquorice Troches.

"Take of Extract of Liquorice, Gum Arabic, of each one part; Refined Sugar, two parts. Let them be dissolved in warm water, and strained. Then evaporate the solution, with a gentle heat, into a mass, which form into troches."

These, from their demulcent quality, may be used to allay coughing, in catarrh; but the simple extract of liquorice is equally effectual, and when purified by solution in water, and afterwards inspissated so as to be of a firm consistence, forming what is named Refined Liquorice, is more grateful. Hence these troches are never used.

TROCHISCI GLYCYRRHIZÆ CUM OPIO. Liquorice Troches with Opium.

"Take of Opium, two drachms; Tincture of Tolu Balsam, half an ounce; Simple Syrup, eight ounces; Extract of Liquorice, softened with Warm Water, Gum Arabic, in powder, of each five ounces. First rub the opium thoroughly with the tincture; then add gradually the syrup and the extract; afterwards sprinkle in the powder of Gum Arabic; and, lastly, dry the mass, that it may be formed into troches, each weighing ten grains."

These are the most active troches in the Pharmacopœia, and are very effectual in relieving the tickling cough frequently attending catarrh. The opium is the ingredient on which their efficacy principally depends, its local operation lessening the irritation which gives rise to coughing; the others cover its taste and flavour, and render the composition pleasant, adding at the same time a demulcent quality. One drachm, or six troches, contain one grain of opium; and from six to twelve may

be taken in twenty-four hours. The composition would be improved, if the proportion of opium were diminished, as they would then be less ungrateful; their action would be more gradual, and a greater number could be easily taken. A substitute might be found too for the balsam of Tolu, the flavour of which is rather unpleasant, and which cannot be supposed to communicate any virtue.

TROCHISCI GUMMOSI. Gum Troches.

"Take of Gum Arabic, four parts; Starch, one part; Refined Sugar, twelve parts. These being rubbed to powder, are to be formed into a mass, with rose water, fit for forming troches."

This composition is designed as a demulcent, but is never used; it is not very pleasant, and gum Arabic, when pure, answers the same purpose equally well.

TROCHISCI NITRATIS POTASSÆ. Troches of Nitrate of Potash.

"Take of Nitrate of Potash, one part; Refined Sugar, three parts. Beat them to powder, and, with mucilage of gum tragacanth, make them into a mass proper for forming troches."

Under this form, nitrate of potash is sometimes used as a refrigerant in angina tonsillaris, and to allay the sense of heat attending salivation, and abate the inflammation, being allowed to dissolve slowly in the mouth. They do not very well retain their form, being liable to become humid, and a mixture of nitre and sugar in powder answers equally well.

CHAPTER XXV.

LINIMENTA, UNGUENTA ET CERATA.—LINIMENTS, OINTMENTS, AND CERATES.

These are compositions of a soft consistence, having some unctuous substance for their basis, such as oil, lard, spermaceti or wax. When the consistence is so soft as to be thick, but nearly fluid, it is termed a Liniment; when it is more firm, it is an Ointment; and when still harder, it forms a Cerate. It is evident that these different degrees of consistence depend on the proportions of the ingredients. Where the oil is in large quantity, a liniment is formed, and the addition to this of a larger proportion of wax forms an ointment or cerate. The following general directions are given in the Edinburgh Pharmacopœia for their preparation. "In making these compositions, fatty and resinous substances are to be melted with a gentle heat, stirring them constantly, sprinkling in at the same time the dry ingredients, if there are any, reduced to a very fine powder, until the mixture, by cooling, become firm." In general, it is better to melt them by the heat of a water bath, than by the direct application of fire to the vessel.

Formerly ointments were numerous and complicated in their composition, and surgeons adapted, with much formality, different ointments to answer different indications. The practice is now more simple; the principal intention in these applications is to keep the parts soft and easy, and to exclude the atmospheric air, and therefore the simplest composition that is of a proper consistence and tenacity answers the purpose. It is only in a few cases that certain substances are added to these simple compositions, with the view of obtaining peculiar effects from their stimulant, or sometimes

their specific operation, or from their chemical action. The consistence of a cerate is usually the most convenient, at least for continued application, that of ointment being rather too thin, especially when it is rendered thinner, by the heat of the part to which it is applied.

LINIMENTUM AQUÆ CALCIS, *sive Oleum Lini cum Calce.* Liniment of Lime Water, or Oil of Lintseed with Lime. (Linimentum Calcis, *Ph. Dub.*)

"Take of Oil of Lintseed, Lime Water, of each equal parts. Mix them."

This is a saponaceous compound, formed by the mutual chemical action of the lime-water and oil. It is a thick bland fluid of a white colour, and is sometimes used as a soothing application to inflamed parts; more particularly to burns, being spread over the surface with a feather. It requires to be extemporaneously prepared, as after a little time the soapy matter separates from the water.

LINIMENTUM SIMPLEX. Simple Liniment.

"Take of Olive Oil, four parts; White Wax, one part."

UNGUENTUM SIMPLEX. Simple Ointment.

"Take of Olive Oil, five parts; White Wax, two parts."

CERATUM SIMPLEX. Simple Cerate.

"Take of Olive Oil, six parts; White Wax, three parts; Spermaceti, one part."

These compositions differ merely in consistence. They are applied, spread on linen, as usual dressings to slight wounds and excoriations. The cerate affords the composition, which, from consistence, is best adapted to this. The following compositions, in the London and Dublin Pharmacopœias, are nearly the same, and are designed for the same purposes.

Unguentum cetacei, Ph. Lond.

Unguentum spermatis ceti, Ph. Dub. Spermaceti Ointment.

The former consists of Spermaceti, six drachms; White Wax, two drachms; Olive Oil, three fluid ounces; the latter, of White Wax, half a pound; Spermaceti, one pound; Prepared Lard, three pounds.

Ceratum cetacei, Spermaceti Cerate, Ph. Lond. —is composed of half an ounce of Spermaceti; two ounces of White Wax; and four fluid ounces of Olive Oil; and hence differs merely in consistence.

Ceratum, Cerate. Ph. Lond.—This consists of four ounces of Yellow Wax; and four fluid ounces of Olive Oil.

Unguentum ceræ flavæ, Ointment of Yellow Wax, Ph. Dub.—is formed from one pound of Purified Yellow Wax, and four pounds of Prepared Lard.

Unguentum ceræ albæ, Ointment of White Wax, Ph. Dub.—is the same composition with the substitution of White for Yellow Wax.

Unguentum resinosum. Resinous Ointment. (Unguentum Resinæ Albæ, *Ph. Dub.*—Ceratum Resinæ, *Ph. Lond.*)

"Take of Hog's Lard, eight parts; White Resin, five parts; Yellow Wax, two parts." In the London Pharmacopœia, a pound of resin and a pound of wax are melted with a pint of olive oil.

The addition of the resin renders this considerably more stimulating than the preceding ointments. Hence it is used as a dressing where the object is to promote suppuration.

UNGUENTUM PULVERIS MELOES VESICATORII, *olim Unguentum Epispasticum fortius.* Ointment of the Powder of Cantharides. (Unguentum Cantharidis, *Ph. Dub.*—Ceratum Lyttæ, *Ph. Lond.*)

"Take of Resinous Ointment, seven parts; Powder of Cantharides, one part."

This is the ointment commonly employed to establish a purulent discharge, or form a superficial issue in the part to which a blister has been applied; this it does from the acrid and stimulating quality of the cantharides, which quickly changes the serous discharge from the blister into one of a purulent nature, and by continuing the application, this may be kept up for any length of time. In preparing it, the cantharides ought to be reduced to a very fine powder.

UNGUENTUM INFUSI MELOES VESICATORII, *olim Unguentum Epispasticum mitius.* Ointment of Infusion of Cantharides.

"Take of Cantharides, White Resin, Yellow Wax, of each one part; Venice Turpentine, Hogs Lard, of each two parts; Boiling Water, four parts. Macerate the cantharides in the water for a night, and strain the liquor, pressing it strongly; having added the lard, boil it until the water is evaporated; then add the wax and resin. These being melted and removed from the fire, add the turpentine."

The ointment with the powder of cantharides sometimes occasions too much pain and irritation. The composition obtained by this process is designed as a milder application, adapted in such cases to answer the same indication. The water, by infusion on the cantharides, extracts the acrid matter, but this, from being in a state of solution, is, after the subsequent evaporation, diffused through the unctuous matter in a state of finer division than the powder can be. It is also from the proportions ordered, in smaller quantity, but its stimulating quality is aided by the turpentine, and it is still sufficiently so to keep up the purulent discharge.

UNGUENTUM SUB-ACETITIS CUPRI, *olim Unguentum Æruginis.* Ointment of Sub-Acetite of Copper, *or* Verdigris. (Unguentum Æruginis, *Ph. Dub.*)

"Take of Resinous Ointment, fifteen parts; Sub-Acetite of Copper, one part."

This ointment is used as a stimulant and escharotic, applied to foul ulcers. It is rather too active, and in general requires to be mixed with an additional proportion of resinous or simple ointment; nor is it used but as an occasional dressing.

UNGUENTUM HYDRARGYRI, *vulgo Unguentum Cæruleum.* Ointment of Quicksilver.

"Take of Quicksilver, Mutton Suet, of each one part; Hogs Lard, three parts. Rub the quicksilver thoroughly in a mortar with a little of the lard, until the globules disappear; then add the remaining fats. It may be made also with a double or triple proportion of quicksilver."

UNGUENTUM HYDRARGYRI FORTIUS. Stronger Ointment of Quicksilver. Ph. Lond.—(Unguentum Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, two pounds; Prepared Hogs Lard, twenty-three ounces; Prepared Tallow, one ounce. Rub first the quicksilver with the tallow and a little lard, until the globules disappear; then add the remaining lard, and mix them." In the Dublin Pharmacopœia, equal weights of quicksilver and lard are directed to be rubbed together, until the globules are no longer visible.

UNGUENTUM HYDRARGYRI MITIUS. Milder Ointment of Quicksilver. *Ph. Lond. Dub.*)

"Take of the Stronger Ointment of Quicksilver, one part; Prepared Hogs Lard, two parts. Mix them." The ointment under the same name in the Dublin Pharmacopœia is ordered to be prepared in the same manner

as the stronger ointment, using a proportion of lard, double that of the quicksilver.

Of these ointments, the one always employed for mercurial friction is that formed from equal weights of quicksilver and lard. The only use of the lard is to facilitate the extinction, as it is called, of the quicksilver, and the introduction of it through the cuticle: these purposes are perfectly attained from this proportion, and any larger quantity of unctuous matter merely weakens it, and renders it necessary to continue the friction longer. The proportion of one part of quicksilver to four of unctuous matter, ordered in the Edinburgh Pharmacopœia, gives an ointment weaker than any that is ever used or kept in the shops. The ointments of the strength ordered in the other Pharmacopœias are those in common use.

This, like other mercurial preparations obtained by trituration, was at one time regarded as deriving its efficacy from the mere mechanical division of the metal. The reasons have been already stated for believing, that in all these preparations the mercury is oxidated, and that their action on the living system depends on this oxide. There are even additional grounds for admitting this conclusion with regard to mercurial ointment. Unctuous matter appears in general to promote the oxidation of metals by the action of the air, as is exemplified in the green crust which copper speedily acquires when coated thinly with grease: quicksilver being in a fluid state, and the surface being extended and renewed, by the trituration, these circumstances are still more favourable to the same change being effected more speedily. The improvement of the ointment from keeping, affords a similar presumptive proof. The ointment is, when newly prepared, of a light bluish gray colour, but when kept for some time it becomes of a much darker colour, probably from the oxidation of the metal becoming more complete; and it has accordingly been found, that from ointment long prepared, less metallic quicksilver subsides, when it is kept liquid by the heat of a water

bath, than from ointment newly prepared. Even from the latter, only part of the quicksilver subsides in globules; the remaining quantity is in the state of a gray powder, which there is every reason to conclude, is the gray oxide of the metal.

It has even been supposed, that the quicksilver in the preparation may suffer a farther change. Unctuous matter, and more especially that of animal origin, is known to become rancid from the action of the air, and this rancidity appears to be connected with the formation of an acid, probably the acid produced from fat, the Sebacic. This change may take place to a certain extent during the trituration, and still more when the ointment is long kept, and may promote the oxidation of the mercury, while any acid that is formed may combine with the oxide. According to this view, mercurial ointment will consist of unctuous matter, in which is diffused oxide and sebate of mercury, with a portion generally of metallic mercury, its activity, of course, depending on the former.

The extinction of the mercurial globules by trituration being rather a laborious process, several expedients have been contrived to facilitate it. Several of these are inadmissible, such as the use of sulphur or turpentine. In the ointment prepared with the former, the mercury is probably not in an active state; it is known by its deep black colour, and by the smell of sulphur exhaled when paper covered with it is kindled. Turpentine renders the ointment too acrid, so that when applied by friction it produces irritation on the skin or inflammation; it also can be detected by the odour exhaled in burning. Rancid fat, it has been found, extinguishes the quicksilver better than recent fat, and may be allowed, as by the action of the metal the rancidity of the fat appears to be corrected. The trituration should always be made at first with a little tallow, as lard does not oppose sufficient resistance to afford all the assistance that may be derived from the interposed matter, in facilitating the mechanical division.

Mercurial ointment is the form under which mercury is introduced into the system by external friction. It is a mode employed with advantage in cases where the preparations administered internally are liable to be too much determined to the intestines, so as to occasion griping or purging, or when it is necessary to introduce a large quantity of mercury speedily into the system; the general mercurial action being thus soon induced. It is likewise sometimes employed in some local affections, particularly bubo. One drachm of the strong ointment (that containing equal parts of mercury and lard) is introduced by friction on the skin in the evening, and frequently also in the morning, until the system is affected, the part on which the ointment is rubbed being occasionally changed to avoid irritation or inflammation. The weaker ointments ought not to be employed, as they merely give unnecessary trouble, by the necessity of rubbing in so much lard.

Unguentum oxidi hydrargyri cinerei. Ointment of Gray Oxide of Quicksilver.

"Take of Gray Oxide of Quicksilver, one part; Hogs Lard, three parts."

This is designed as a substitute for the mercurial ointment, and, as the quicksilver is fully oxidated, it has been supposed that it will prove more active and certain. It probably would have this advantage; but it has been said, that it is not easily introduced by friction, the unctuous matter passing through the cuticle without the whole of the oxide,—a difference which, if it do exist, must depend on the combination being less intimate.

Unguentum oxidi hydrargyri rubri. Ointment of Red Oxide of Quicksilver. (Unguentum Hydrargyri Nitrico-oxydi, *Ph. Lond.*—Unguentum Sub-nitratis Hydrargyri, *Ph. Dub.*)

"Take of Red Oxide of Quicksilver by Nitric Acid, one part; Hogs Lard, eight parts."

This is applied as a mild escharotic to remove the diseased surface of ulcers, and as a stimulant to promote suppuration; and in cases of languid ulceration and chronic inflammation is often used with much advantage. Care ought to be taken in its preparation, that the mercurial preparation is reduced to a very fine powder. It ought also to be prepared only when it is to be used, or at least ought not to be long kept, as the mercurial oxide or rather sub-nitrate soon undergoes decomposition, which is indicated by the colour changing from a bright red to a gray.

UNGUENTUM NITRATIS HYDRARGYRI FORTIUS, *vulgo Unguentum Citrinum*. Stronger Ointment of Nitrate of Quicksilver. (Unguentum Hydrargyri Nitratis, *Ph. Lond.*—Unguentum Supernitratis Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, one part; Nitrous Acid, two parts; Olive Oil, nine parts; Hogs Lard, three parts. Dissolve the quicksilver in the acid; then beat up the solution strongly with the lard and oil previously melted together, and beginning to cool, in a glass mortar, so as to form an ointment."

In this ointment the nitrate of quicksilver is combined with the lard; and as there is also an excess of nitric acid, it acts chemically on the fat, and, notwithstanding the quantity of oil used, gives to the composition a firm consistence. It forms a very excellent application in various forms of chronic inflammation, such, for example, as psorophthalmia, and in different kinds of cutaneous eruption, herpetic, or connected with superficial inflammation or ulceration. It is either rubbed gently on the part affected, or where this would produce irritation, it is applied, softened by heat, by a hair pencil.

UNGUENTUM NITRATIS HYDRARGYRI MITIUS. Milder Ointment of Nitrate of Quicksilver.

"This is made in the same manner as the preceding, with a triple proportion of lard and oil."

This is designed to afford an application milder than the former, and also of a softer consistence; but, to obtain the latter convenience, it is better to reduce the strong ointment with the requisite proportion of lard, when it is to be used, as, from the operation of the acid, the milder ointment, even with the increased proportion of unctuous matter, is nearly equally firm as the stronger ointment.

UNGUENTUM ACIDI NITROSI. Ointment of Nitrous Acid. (Unguentum Acidi Nitrosi, *Ph. Dub.*)

"Take of Hogs Lard, one pound; Nitrous Acid, six drachms. Mix the acid gradually with the melted lard, and beat the mixture thoroughly while it cools."

In this preparation part of the acid is decomposed, and part of it is combined with the lard. It is designed as an application in cutaneous affections, and has been said to be similar in its effects to the preceeding ointment. It appears, however, considerably inferior in efficacy, and since its first introduction it has been little used.

UNGUENTUM OXIDI PLUMBI ALBI. Ointment of White Oxide of Lead. (Unguentum Cerussæ sive Sub-acetatis Plumbi, *Ph. Dub.*)

"Take of Simple Ointment, five parts; White Oxide of Lead, one part."

This has been used principally as an application to burns and superficial inflammation.

UNGUENTUM ACETITIS PLUMBI, *vulgo Unguentum Saturninum.* Ointment of Acetite of Lead. (Ceratum Plumbi Super-acetatis, *Ph. Lond.*—Unguentum Acetatis Plumbi, *Ph. Dub.*)

"Take of Simple Ointment, twenty parts; Acetite of Lead, one part."

The preparations of lead have been supposed to possess a specific power in abating inflammation by local application. They are usually applied under the form of solution; but where that of ointment is preferred, this

composition has been considered as preferable to any other, as containing the most active preparation of lead. It is accordingly often used as a dressing to inflamed parts.

CERATUM PLUMBI COMPOSITUM. Compound Cerate of Lead. Ph. Lond.

"Take of Solution of Acetate of Lead, two fluid ounces and a half; Yellow Wax, four ounces; Olive Oil, nine ounces; Camphor, half a drachm. Mix the wax melted, with eight fluid ounces of the oil, then remove the mixture from the fire, and as soon as it begins to become thick, add gradually the solution of acetate of lead, and stir them constantly with a wooden spatula. Lastly, mix with these the camphor dissolved in the remaining oil."

A composition similar to this was introduced by Goulard, as a form of applying lead in ointment. It has been known by the name of Goulard's Cerate, and has been supposed preferable to the preceding ointment. It may derive some slight advantage as a soothing application to inflamed parts, from its soft consistence, and from the acetate of lead being diffused through it in a dissolved state.

CERATUM CARBONATIS ZINCI IMPURI, *olim Ceratum Lapidis Calaminaris*. Cerate of Impure Carbonate of Zinc. (Ceratum Calaminæ, *Ph. Lond.*—Unguentum Calaminaris, *Ph. Dub.*)

"Take of Simple Cerate, five parts; Prepared Impure Carbonate of Zinc, one part."

This is the common healing cerate, Turner's Cerate as it has been named, which has long been used as a dressing to slight wounds, excoriations, and ulcers. It appears to act simply by excluding the air and keeping the surface to which it is applied soft; but it is preferable to the composition of wax and oil alone, from the levigated calamine giving a degree of consistence, which is not altered by the heat of the body.

UNGUENTUM OXIDI ZINCI IMPURI, *olim Unguentum Tutiæ.* Tutia Ointment. (Unguentum Tutiæ, *Ph. Dub.*)

"Take of Simple Liniment, five parts; Prepared Impure Oxide of Zinc, one part."

This has been used principally as an application in chronic ophthalmia, but it appears to have no particular virtue.

UNGUENTUM OXIDI ZINCI. Ointment of Oxide of Zinc. (Unguentum Zinci, *Ph. Lond.*—Unguentum Oxidi Zinci, *Ph. Dub.*)

"Take of Simple Liniment, six parts; Oxide of Zinc, one part."

This was introduced as a substitute for the calamine cerate, oxide of zinc being supposed a purer substance than the calamine stone. Calamine, however, acts merely mechanically in the composition, and there is no advantage in the substitution of the more expensive oxide; hence this ointment is seldom used. Sometimes it has been applied in ophthalmia.

UNGUENTUM PICIS. Ointment of Tar. (Unguentum Picis Liquidæ, *Ph. Lond. Dub.*)

"Take of Tar, five parts; Yellow Wax, two parts." In the London and Dublin Pharmacopœias, the composition is equal weights of Tar and Tallow melted together.

This stimulating ointment is sometimes applied to foul ulcers, and has been used with advantage in tinea capitis.

UNGUENTUM PICIS ARIDÆ. Pitch Ointment. Ph. Lond.

"Take of Pitch, Yellow Wax, Yellow Resin, of each nine ounces; Olive Oil, a pint. Melt them together, and strain through linen."

This is applied to the same purposes as the preceding ointment, from which it differs a little in consistence, and in its smell being less strong.

Unguentum sulphuris. Ointment of Sulphur. (Unguentum Sulphuris, *Ph. Lond. Dub.*)

"Take of Hogs Lard, four parts; Sublimed Sulphur, one part. To each pound of this ointment, add of Essential Oil of Lemon, or Essential Oil of Lavender, half a drachm." The essential oil, which is designed merely to cover the unpleasant smell of the sulphur, is not ordered in the London or Dublin Pharmacopœia.

Sulphur is applied under this form as a remedy in psora, the surface affected with the eruption being rubbed with the ointment.

Unguentum sulphuris compositum. Compound Sulphur Ointment. Ph. Lond.

"Take of Sublimed Sulphur, half a pound; Root of White Hellebore, in powder, two ounces; Nitrate of Potash, a drachm; Soft Soap, half a pound; Prepared Lard, a pound and a half."

White hellebore root has been employed with advantage in psora, and this compound ointment may perhaps prove successful in cases where the simple sulphur ointment might be more slow in its operation or fail.

Unguentum elemi compositum. Compound Ointment of Elemi. Ph. Lond.

"Take of Elemi, one pound; Common Turpentine, ten ounces; Prepared Suet, two pounds; Olive Oil, two fluid ounces. Melt the elemi with the suet, and having removed them from the fire, mix them immediately with the turpentine and oil; then strain through linen."

This ointment is moderately stimulating, somewhat similar to the resinous ointment, and is applied to the same purpose, that of exciting suppuration from an ulcer. There is a similar composition in the Dublin

Pharmacopœia, under the name of Unguentum Elemi, in which a pound of Elemi, half a pound of Wax, and four pounds of Lard are melted together.

Unguentum sambuci. Ointment of Elder. *Ph. Lond.* (Unguentum Sambuci, *Ph. Dub.*)

"Take of the Flowers of Elder, Prepared Lard, of each two pounds. Boil the flowers of elder with the lard until they become friable; then strain through linen."

The elder flowers communicate to the unctuous matter a rich green colour. Ointments and plasters thus coloured by different herbs were formerly in use, but they have been properly discarded as possessed of no useful quality, and as the easier mode of giving them a colour, by the addition of some green pigment, came to be substituted in the shops for that of boiling the unctuous matter with the fresh vegetable.

Unguentum veratri. Ointment of White Hellebore. *Ph. Lond.* (Unguentum Hellebori Albi, *Ph. Dub.*)

"Take of White Hellebore, rubbed to powder, two ounces; prepared Hogs Lard, eight ounces; Oil of Lemon, twenty minims. Mix them." In the composition of the Dublin Pharmacopœia the oil is omitted, and the proportion of hellebore is only three ounces to a pound of lard.

Hellebore is used, under this form, as an application to psora. It proves sometimes effectual, and is less disagreeable than the application of the sulphur ointment.

Unguentum hydrargyri præcipitati albi. Ointment of White Precipitate of Mercury. *Ph. Lond.* (Unguentum Sub-Muriatis Hydrargyri Ammoniati, *Ph. Dub.*)

"Take of White Precipitate of Mercury, a drachm; Prepared Lard, an ounce and a half. To the lard melted with a gentle heat, add the precipitate of mercury, and mix them."

This is sometimes used as a very mild escharotic, and as a remedy in some cutaneous eruptions.

CERATUM SAPONIS. Cerate of Soap. Ph. Lond.

"Take of Hard Soap, eight ounces; Yellow Wax, ten ounces; Semi-vitrified Oxide of Lead in powder, one pound; Olive Oil, one pint; Vinegar, one gallon. Boil the vinegar with the oxide of lead on a slow fire, stirring constantly until they unite together; then add the soap, and again boil in a similar manner until the water is entirely dissipated: lastly, mix with these the wax previously melted with the oil; then mix with it the other ingredients, so as to form a cerate."

This composition must derive any efficacy it has, principally from the acetate of lead, formed by the boiling of the vinegar on the litharge, and it appears to be an operose process to obtain a composition which has no very particular advantage.

CERATUM SABINÆ. Cerate of Savine. *Ph. Lond.* (Unguentum Sabinæ, *Ph. Dub.*)

"Take of the Fresh Leaves of Savine, bruised, one pound; Yellow Wax, half a pound; Prepared Lard, two pounds. Boil the leaves of the savine with the lard and wax melted together; then strain through linen." In the Dublin Pharmacopœia, only half a pound of savine is ordered to the above proportion of lard and wax.

This ointment is designed as a substitute for the cantharides ointment, as an application to excite suppuration, and continue a purulent discharge, which it is said to do without producing pain or irritation, consequences that occasionally result from the common issue ointment. It is also sometimes used, prepared from the leaves of savine, reduced to fine powder, and mixed with lard.

UNGUENTUM PIPERIS NIGRI. Ointment of Black Pepper. Ph. Dub.

"Take of Prepared Lard, one pound; Black Pepper, rubbed to powder, four ounces. Form them into an ointment."

This must form a very stimulating ointment. For what purpose it is designed is not very obvious.

LINIMENTUM HYDRARGYRI. Liniment of Quicksilver. Ph. Lond.

"Take of the Strong Mercurial Ointment, Prepared Lard, of each four ounces; Camphor, one ounce; Rectified Spirit, fifteen minims; Water of Ammonia, four fluid ounces. Rub the camphor first with the spirit, then with the lard and mercurial ointment; lastly, adding gradually the water of ammonia, mix the whole together."

This is designed as a stimulating application and discutient, to be applied to indolent tumors or collections of fluid; by its stimulant action it may promote absorption, and the mercury introduced by the friction may exert a more permanent action.

LINIMENTUM TEREBINTHINÆ. Turpentine Liniment.

"Take of the Resin Cerate, a pound; Oil of Turpentine, half a pint. To the melted cerate add the oil of turpentine, and mix them together."

Oil of turpentine has been found to be a successful application to burns, and this liniment is a form under which it has been used.

CHAPTER XXVI.

EMPLASTRA.—PLASTERS.

Plasters are of similar composition to ointments, but differ from them in their much firmer consistence, which is such, that they do not adhere to the hand. They owe this consistence, in general, to a larger proportion of wax, or sometimes to the addition of certain metallic oxides, particularly those of lead, which unite chemically with the unctuous matter. They require, in general, to be heated, in order to be spread: hence they adhere more firmly, and several of them even afford a mechanical support. They are employed generally to answer the same indications as ointments. The same rules are to be observed in their preparation, as in that of Ointments.

Emplastrum simplex, *olim Emplastrum Cereum.* Simple Plaster. (Emplastrum Ceræ, *Ph. Lond.*)

"Take of Yellow Wax, three parts; Mutton Suet, Resin, of each two parts."

The principal use of this plaster is as a dressing to the part to which a blister has been applied, after the vesicle has been cut. It is spread thin on linen with a hot iron.

Emplastrum oxidi plumbi semi-vitrei, *olim Emplastrum Commune.* (Emplastrum Plumbi, *Ph. Lond.*—Emplastrum Lithargyri, *Ph. Dub.*)

"Take of the Semi-vitreous Oxide of Lead, one part; Olive Oil, two parts. Having added water, boil them, stirring constantly, until the oil and the oxide unite into a plaster."

This, which has been long known by the name of

Diachylon, is a chemical combination of the expressed oil with the oxide of lead, and is of a consistence sufficiently hard to form a plaster. There is considerable attention requisite in preparing it, particularly in stirring it constantly to promote the combination, and allow of the escape of the watery vapour. The use of the water is to prevent the heat from rising too high, and if the quantity is dissipated before the combination is complete, an additional portion must be added, taking care to add it hot. The plaster is used, spread on leather or linen, as an application to excoriations or slight wounds.

EMPLASTRUM RESINOSUM, *olim Emplastrum Adhæsivum.* Resinous Plaster. (Emplastrum Resinæ, *Ph. Lond.*—Emplastrum Lithargyri cum Resina, *Ph. Dub.*)

"Take of Plaster of Semi-vitreous Oxide of Lead, five parts; Resin, one part."

The plaster of litharge is rendered more adhesive, and somewhat more stimulating by this intermixture of resin. It is applied to similar uses.

EMPLASTRUM OXIDI FERRI RUBRI, *olim Emplastrum Roborans.*

"Take of Plaster of Semi-vitreous Oxide of Lead, twenty-four parts; 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 add it to the other ingredients melted." There is a similar composition in the Dublin Pharmacopœia, under the name of EMPLASTRUM THURIS, in which two pounds of litharge plaster, and half a pound of frankincense, are melted together, and three ounces of red oxide of iron added.

These plasters, spread on leather, are sometimes used as an application in slight cases of lumbago, and give some relief, merely by affording a mechanical support.

EMPLASTRUM ASSÆ FOETIDÆ. Assafœtida Plaster.

"Take of Plaster of Semi-vitreous Oxide of Lead,

Assafœtida, of each two parts; Galbanum, Yellow Wax, of each one part."

This plaster is sometimes applied to the breast or side, as a remedy in hysteric affections, but probably with little advantage.

Emplastrum gummosum. Gum Plaster.

"Take of Plaster of Semi-vitreous Oxide of Lead, eight parts; Gum-Resin of Ammoniac, Galbanum, Yellow Wax, of each one part."

Emplastrum galbani. Galbanum Plaster. Ph. Dub.

"Take of the Plaster of Litharge, two pounds; Galbanum, half a pound; Yellow Wax, four ounces. To the galbanum melted with a gentle heat, add the litharge, plaster, and wax, and melt them with a moderate heat."

Emplastrum galbani compositum. Compound Galbanum Plaster. Ph. Lond.

"Take of Galbanum purified, eight ounces; Plaster of Lead, three pounds; Common Turpentine, ten drachms; Frankincense bruised, three ounces. To the galbanum and turpentine previously melted together, add first the frankincense, then the plaster of lead, melted with a slow fire, and mix them."

These three plasters are essentially the same. They are employed as discutient applications to indolent tumors, and sometimes to promote suppuration.

Emplastrum hydrargyri. Quicksilver Plaster. (Emplastrum Hydrargyri, *Ph. Lond.*)

"Take of Olive Oil, Resin, of each one part; Quicksilver, three parts; Plaster of Semi-vitrous Oxide of Lead, six parts. Rub the quicksilver with the oil and resin melted together, and then cooled, until the globules disappear; then add gradually, the plaster of semi-vitre-

ous oxide of lead, melted, and mix the whole carefully." The composition in the London Pharmacopœia is somewhat different. It consists of "Purified Quicksilver, three ounces; Sulphurated Oil, half a drachm; Plaster of Lead, a pound. Rub the quicksilver with the sulphurated oil until the globules disappear, then add gradually the plaster of lead, melted, and mix them." The sulphurated oil causes the mercury to lose the form of globules more quickly, and therefore abridges the labour of the preparation; but it may be doubted if the quicksilver thus extinguished is in the same state of activity as when this has been done by trituration with unctuous matter alone.

The mercurial plaster is applied as a discutient to indolent tumours; and it has been supposed, that from its continued application, the mercury will be absorbed, and act locally, particularly in glandular affections.

Emplastrum saponaceum. Soap Plaster. (Emplastrum Saponis, *Ph. Lond. Dub.*)

"Take of Plaster of semi-vitreous oxide of Lead, four parts; Gum Plaster, two parts; Soap sliced, one part. Mix the soap with the plasters melted together; then boil a little, so as to form a plaster." In the London and Dublin Pharmacopœias, the plaster is formed from litharge plaster and soap alone.

This has been supposed to possess a discutient quality; but it is much inferior to the mercurial plaster, and is scarcely ever used.

Emplastrum meloes vesicatorii, *olim Emplastrum Vesicatorium.* Plaster of Cantharides. (Emplastrum Cantharidis, *Ph. Dub.*—Emplastrum Lyttæ, *Ph. Lond.*)

"Take of Mutton Suet, Yellow Wax, Resin, Cantharides, of each equal weights. Mix the cantharides, rubbed into a fine powder, with the other ingredients, melted together and removed from the fire."

This is the plaster usually employed to raise a blister,

an effect produced from the action of the acrid matter of the cantharides. It is of a softer consistence than the other plasters, that it may admit of being spread without the assistance of heat, which would impair the acrid quality. It is spread on leather, and requires to be applied twelve hours to produce a perfect blister: it is then removed; the vesicle is cut, and the inflamed surface dressed with simple cerate or plaster. In cases where it is of importance that a blister should be raised with certainty, and speedily, it is of advantage to sprinkle a little of the powder of cantharides on the surface of the plaster when spread. Washing the part previously with vinegar, is also useful to insure the effect. Camphor is sometimes mixed with the blistering composition, on the supposition that it prevents the strangury, which is sometimes produced by a large blister; but it appears to have no such virtue, and this painful symptom is more effectually obviated by the free use of diluents while the blister is applied,—a practice always proper where the system is irritable, or even in common cases where the blister is large.

EMPLASTRUM MELOES VESICATORII COMPOSITUM. Compound Plaster of Cantharides.

"Take of Venice Turpentine, eighteen parts; Burgundy Pitch, Cantharides, of each twelve parts; Yellow Wax, four parts; Sub-acetite of Copper, two parts; Mustard Seed, Black Pepper, of each one part. To the Burgundy pitch and wax melted, add the turpentine. While these are melted and still warm, add the other ingredients mixed and rubbed to a fine powder, stirring constantly, so as to form a plaster."

It occasionally happens, that the common plaster of cantharides is insufficient to excite a blister, even when its surface has been sprinkled over with powdered cantharides. In such cases, or even in others where it is necessary that a blister should be quickly raised, and where the system is not easily affected, as in comatose diseases, this more powerful composition may be em-

ployed. Its operation is accompanied with a very pungent sensation of heat. The application of it ought not to be continued too long, as it might induce ulceration; and the precaution of the patient drinking freely of any mild diluent while it is applied, ought also to be attended to.

EMPLASTRUM AMMONIACI. Ammoniac Plaster. Ph. Lond.

"Take of Gum-Resin of Ammoniac, purified, five ounces; Acetic Acid, half a pint. Dissolve the ammoniac in the vinegar; then evaporate the liquor in an iron vessel by the heat of a water-bath, stirring it constantly until it attain a proper consistence."

Under this form, gum-ammoniac is applied as a discutient, and sometimes also as a remedy in tinea capitis; and as it is occasionally used, the London College have received it as an officinal preparation.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. Plaster of Ammoniac with Quicksilver. *Pharm. Lond. Dub.*

"Take of Purified Ammoniac, one pound; Purified Quicksilver, three ounces; Sulphurated Oil, one fluid drachm. Rub the quicksilver with the sulphurated oil until the globules disappear; then add gradually the ammoniac melted, and mix them."

This is similar to the simple mercurial plaster, its discutient and stimulant powers being perhaps somewhat promoted by the ammoniac. It is applied to the same purposes.

EMPLASTRUM CUMINI. Cumin Plaster. Ph. Lond.

"Take of Cumin Seeds, Carraway Seeds, Bay Berries, of each three ounces; Burgundy Pitch, three pounds; Yellow Wax, three ounces. To the pitch and wax melted, add the other ingredients rubbed to powder, and mix them."

This has been applied to the region of the stomach as a moderate stimulant in hysteric affections and flatulent colic, but it cannot be supposed to be of any advantage.

EMPLASTRUM OPII. Opium Plaster, Ph. Lond.

"Take of Hard Opium in powder, half an ounce; Frankincense bruised, three ounces; Plaster of Lead, a pound. To the plaster melted, add the frankincense and opium, and mix them."

Opium has sometimes been used as an anodyne, by external application, with advantage, as, for example, in relieving the pain of toothach. This plaster, newly introduced into the London Pharmacopœia, is designed to afford a form of applying it, though the more usual mode of extending a piece of opium softened between the fingers on leather or silk is probably to be preferred, as even more effectual.

EMPLASTRUM PICIS COMPOSITUM. Compound Pitch Plaster. Pharm. Lond.

"Take of Burgundy Pitch, two pounds; Frankincense, one pound; Yellow Resin, Yellow Wax, of each four ounces; Expressed Oil of Nutmeg, one ounce. To the pitch, resin and wax, melted together, add first the frankincense, then the oil of nutmeg, and mix them together."

Burgundy pitch is in common use as a rubefacient, under the form of plaster. The addition of the other ingredients of this compound plaster, may render it rather more stimulating, and the wax adds to its tenacity, and gives to the plaster a due consistence.

EMPLASTRUM CALEFACIENS. Warm Plaster. Ph. Dub.

"Take of Burgundy Pitch, seven parts; Plaster of Cantharides, one part. Melt them together with a moderate heat, and stir until they attain the consistence of a plaster."

By the addition of this small proportion of cantharides, the stimulating power of the Burgundy pitch is still more increased than by the articles added in the preceding composition. This accordingly affords a very excellent rubefacient, which is frequently employed.

EMPLASTRUM AROMATICUM. Aromatic Plaster. Ph. Dub.

"Take of Frankincense, three ounces; Yellow Wax, half an ounce; Cinnamon Bark in powder, six drachms; Essential Oil of Pimento, Essential Oil of Lemons, of each two drachms. Melt the frankincense and wax together, and stir, as it thickens on becoming cold. Mix with it the cinnamon, previously rubbed with the essential oils, and form them into a plaster."

This is designed as a stomachic plaster, being applied to the region of the stomach in some forms of dyspepsia. It ought to be always extemporaneously prepared, as the essential oils are soon volatilized.

CATAPLASMATA.—CATAPLASMS.

CATAPLASMA FERMENTI. Yeast Cataplasm. Ph. Lond.

"Take of Flour, a pound; Yeast of Beer, half a pint. Mix them, and apply a gentle heat until the mixture begins to rise."

The yeast, mixed with the flour, and aided by the heat applied, soon excites fermentation, and the cataplasm in this state has been applied with much advantage as an anodyne in painful and irritable sores, and as an antiseptic in ulceration, attended with fœtor. Its efficacy appears to depend on the carbonic acid gas evolved by the fermentative process.

CATAPLASMA SINAPIS. Mustard Cataplasm. *Ph. Lond. Dub.*

"Take of Mustard Seeds, Lintseed, of each in powder, half a pound; Vinegar, warm, as much as is suffi-

cient. Mix, so as to obtain the consistence of a cataplasm." In the Dublin Pharmacopœia, it is formed from equal qualities of mustard seed in powder and crumbs of bread mixed with as much wine vinegar as is required; and it is added, that the cataplasm may be rendered more stimulating by the addition of two ounces of horse-radish root, finely scraped.

The Mustard Cataplasm, or Sinapism as it is named, is the composition usually applied as a powerful stimulant to the soles of the feet, in typhus, where there is a determination to the head, and in comatose affections. It acts as a very powerful rubefacient; its action is attended with a sense of heat and pain, which soon become urgent, and hence, when applied in a state of coma, the application ought not to be continued too long. It operates on the same principle as a blister, and differs principally in its effect being more quickly obtained, and being more powerfully stimulant to the general system, without producing the same extent of superficial inflammation.

APPENDIX

TO

VOLUME SECOND.

MINERAL Waters are complicated in their composition, and, according to the substances with which they are impregnated, produce different effects on the system, and are hence employed to answer different indications. At the same time, they have certain common medicinal relations. They are therefore not easily arranged under the classes of the Materia Medica, when these are established on analogies in medicinal operation. It is also of advantage to give a connected view of their chemical analysis. I have therefore thought it preferable to place them together, and have accordingly referred them to this appendix. The Elastic Fluids that have been employed medicinally, require a similar arrangement, as there is the same difficulty in placing them under the respective classes of medicines; and from the peculiarities in their preparation and mode of operation, the same advantage in giving their history in connection. I have added a few observations on the medical employment of Electricity and Galvanism, to complete the view of what properly belongs to Materia Medica. And, lastly, as connected with the subject, I have subjoined the heads of a lecture, which I have been accustomed to deliver on the doses of medicines, and the rules that regulate extemporaneous prescription.

I.—OF MINERAL WATERS.

Waters, which flow at the surface of the earth, are frequently impregnated with foreign matter, so far as to acquire peculiar taste or odour, to be capable of exerting specific chemical actions, or to produce changes in the state of the living system. Such waters are denominated Mineral, it being usually matter belonging to the mineral kingdom which communicates these powers.

Important medicinal effects are frequently obtained from mineral waters, arising primarily from the operation of the substances which they hold dissolved, though this is no doubt aided by the state of dilution in which they are administered, the action of the water itself as a diluent, and by other external circumstances. The chemical analysis, therefore, of these waters is of importance, as determining the principles in which their active powers reside, and thus enabling the physician to employ them with more advantage and discrimination.

Mineral waters, both in a chemical classification, and considered in relation to their medicinal use, may be arranged under four orders: Carbonated Mineral Waters, or those impregnated with carbonic acid gas; Sulphureous Mineral Waters, or those impregnated with sulphuretted hydrogen; Saline Mineral Waters, or those which hold certain neutral salts in solution; and Chalybeate Mineral Waters, or those, the properties of which depend on an impregnation of iron. These indeed are not perfectly insulated, but, in general, those of one division have a certain relation to those of the others, by being likewise impregnated with one or other of the ingredients which these contain. But still each may be classed according to its predominant ingredient, or that which gives it its most characteristic chemical and medicinal powers.

It would be foreign to the object of this outline, to give the minute details connected with the analysis of mineral waters. This properly belongs to a System of

Chemistry. It will be sufficient to point out the general modes of analysis, or rather of discovering their principles, and to add to this chemical view, a brief account of their medicinal applications.

I. Carbonated Mineral Waters.—The waters referred to this class are those which contain carbonic acid gas; and to bring them under the appellation of mineral waters, this must be present in such quantity as to communicate certain sensible qualities. Waters impregnated with free carbonic acid gas, sparkle when drawn from the spring, or poured into a glass; they have a taste more or less pungent and acidulous, but become vapid from exposure to the air. Along with the carbonic acid there may be present, and, indeed, generally are present, portions of saline earthy or metallic matter, chiefly carbonates of lime, magnesia, and iron. But the carbonic acid in excess still communicates the same sensible qualities, modified, particularly with regard to medicinal powers, by these impregnations.

Carbonic acid in excess, in a mineral water, is discovered, when present in any considerable proportion, by the qualities above enumerated, communicated to the water. It is also easily distinguished, even when in more minute quantity, by chemical tests. Infusion of litmus receives from the addition of the water a red tint, which is evanescent, disappearing from exposure to the air, and more quickly when heat is applied. And lime water produces a milkiness or precipitation; the lime, when the lime water is added in due proportion, forming with the carbonic acid, carbonate of lime, which is insoluble. But the turbid appearance is removed, and the transparency restored, either by adding an additional quantity of the mineral water, the excess of carbonic acid thus communicated rendering the carbonate soluble, or by adding a few drops of nitric or muriatic acid, either of which decomposes the carbonate, and dissolves the lime. By the evanescent redness, carbonic acid is discriminated from any other free acid that a mineral water might

hold dissolved; and by the precipitate formed by lime disappearing from the addition of a larger quantity of the mineral water, or of a little muriatic or nitric acid, the fallacy is guarded against that might arise from any precipitation produced by sulphates that the water might contain.

The quantity of carbonic acid contained in the mineral waters is very various. Under a common pressure, pure water can absorb its own volume of the gas, but the quantity in any mineral water is generally much inferior to this. The quantity is discovered by expelling the gas from a given quantity of the water, by heating it gradually in a retort nearly filled to the neck, receiving the elastic fluid in a graduated jar, over quicksilver, and observing the diminution of volume it sustains, by the introduction of a solution of potash, this giving the volume of carbonic acid gas.

Waters highly impregnated with carbonic acid gas are grateful from their pungency, sit light on the stomach, and in a large dose produce even sensibly a degree of exhilaration; they increase the appetite, and generally have a diuretic effect. They prove useful in dyspeptic affections, from the grateful and moderate stimulus exerted by the carbonic acid on the stomach, aided by the diluent operation of the water, and hence the advantage derived from them in the numerous chronic affections connected with impaired power of the digestive organs. They generally also contain some saline substances, which communicate additional powers, and the operation of these is usually promoted, or at least they are rendered more grateful, by the carbonic acid. Those which contain carbonate of soda, as Seltzer water, prove more powerfully diuretic, and are employed with advantage, as palliatives in urinary calculus, and in the painful discharge of urine from other affections of the urinary organs. Those impregnated with iron are more particularly employed in those diseases in which that metal is beneficial. Some of the most celebrated mineral waters of Europe belong to this class, such as

the Spa, Pyrmont, and Seltzer Water. The Pyrmont contains very nearly its own volume of the gas; the Seltzer, more than half its volume; the Spa, rather less than half the volume: they besides hold dissolved carbonates of soda, lime, and magnesia; and the Spa and Pyrmont have a considerable impregnation of carbonate of iron. Their more minute analysis will be found in the table at the end of this article. None of the mineral springs of this country are much impregnated with carbonic acid; and those which contain any sensible quantity, as the waters of Bristol and Cheltenham, derive more activity from the presence of other substances.

II. Sulphureous Mineral Waters.—These waters owe their distinguishing character to an impregnation of sulphuretted hydrogen, and they are at once recognised by their peculiar fœtid smell. They are transparent when drawn from the spring, but become turbid from exposure to the air, and gradually lose their odour. When strongly impregnated, they redden infusion of litmus, and even in their weakest state give a dark precipitate with solution of nitrate of silver, or acetate of lead, or tarnish the metals.

To estimate the quantity of sulphuretted hydrogen gas contained in these waters, various methods have been employed. The gas is not easily expelled entirely by heat, nor is it easily collected, so as to measure it accurately, water absorbing it, and quicksilver decomposing it: it may also have an intermixture of carbonic acid gas, and the proportion of this is not easily ascertained, both gases being absorbed by the same liquids. The mode which has been followed is to decompose the sulphuretted hydrogen, by adding to the water, either highly fuming nitrous acid, as long as there is any precipitation of sulphur, (this precipitation being occasioned by the oxygen of the acid combining with the hydrogen of the sulphuretted hydrogen), or, according to a method preferred by Kirwan, mixing nitric oxide gas with atmospheric air, in a jar over the water, when

nitrous acid is formed, and produces a similar decomposition. The precipitated sulphur is collected on a filter, and from its quantity, the quantity of sulphuretted hydrogen is inferred, 30 grains of sulphur being supposed to be contained in 100 cubic inches of the gas. This estimate, however, of the proportion of sulphur in sulphuretted hydrogen is somewhat uncertain, and the method is liable to fallacy, from the action of the acid becoming weak by its dilution, so as not to precipitate the whole of the sulphur, or, if it be used in excess, from its communicating oxygen, and converting it partially into sulphuric acid.

The sulphurous mineral waters almost uniformly contain saline substances, which modify their powers. From the action of the sulphuretted hydrogen, they are employed more particularly in cutaneous affections; and from the combined action of this and the saline matter, which generally has a purgative effect, they are farther used in diseases of the digestive organs, dyspepsia, hypochondriasis, torpor of the intestines, and visceral obstructions; and also in scrofulous affections. They are also applied locally in cutaneous eruptions, and the warm sulphurous baths have been in particular celebrated for their efficacy under this form of application. The principal sulphurous mineral waters of this country are those of Harrowgate and Moffat: the former have a large proportion of saline matter, muriates and carbonates. Those celebrated on the continent are chiefly the warm sulphurous springs of Aix la Chapelle, and Barege.

III. Saline Mineral Waters.—Under this class are comprised those waters in which, without any large proportion of aërial matter, various saline compounds, generally neutral, exist. The salts most usually present are sulphates, muriates and carbonates; and the bases with which the acids forming these are combined are soda, magnesia and lime. Their analysis is accomplished, first, by detecting, by the employment of tests, the acids

present and the bases by which these are neutralized; and, secondly, obtaining the entire salts by evaporation, or by the action of certain re-agents.

In these waters, there is often an impregnation of elastic fluid, particularly of carbonic acid, which would modify the results from the application of tests. This, after its nature has been determined by experiment, is expelled by heat, in order to facilitate the farther analysis; and in general also, it is of advantage to reduce the volume of the water by evaporation, as the operation of tests becomes then much more sensible than under a state of great dilution.

Sulphuric acid, in any state of combination in a mineral water, is discovered with great delicacy by muriate of barytes, the barytes attracting it, and forming a compound not sensibly soluble, the production of which, therefore, gives rise to a turbid appearance, and precipitation. The only fallacy that requires to be guarded against is, that the same apparent results may be produced by carbonic acid present in the mineral water, either in a free or combined state; but this is easily discovered by the precipitation or turbid appearance being removed, by the addition of a few drops of nitric acid, or not appearing if this has been added to the mineral water previous to the addition of the muriate of barytes. Other tests of sulphuric acid have been employed, such as superacetate of lead, and nitrate of mercury; but these are both less delicate and less accurate.

Muriatic acid is detected by nitrate of silver, the oxide of silver combining with the muriatic acid, and forming an insoluble compound, which gives to the water first a bluish white turbid appearance, and ultimately precipitates. This test is extremely delicate, or detects the most minute quantity of muriatic acid, and in any state of combination whatever. But it is liable to fallacies, against which it is necessary to guard. The principal of these arise from the presence of carbonic acid or sulphuric acid, either of these giving rise likewise to milkiness and precipitation on the addition of the so-

lution of silver. The operation of carbonic acid is prevented by previously adding a little pure nitric acid to decompose any carbonate: that of sulphuric acid can be obviated only by removing it by the previous addition of nitrate of barytes, as long as any precipitation is induced. If, on adding to the transparent fluid, after these preliminary experiments, the nitrate of silver, any milkiness is produced, this indicates the presence of muriatic acid. Sulphuretted hydrogen gives a precipitate with test; but the nature of this is, from its this dark colour, sufficiently evident.

Carbonic acid, in a combined state, is detected by muriate of barytes producing a turbid appearance, and a precipitation, which are removed by the addition of a few drops of nitric acid. Waters containing any considerable impregnation, either of alkaline or earthy carbonates, sensibly affect the vegetable colours, changing, when there is no excess of carbonic acid, or when this is removed by ebullition, the colour of Brazil wood, which is red, to a tint of blue, or restoring the blue tint of litmus which had been reddened by the addition of a little vinegar. When the water is considerably reduced by evaporation, a sensible effervescence is excited on the addition of an acid; and during the evaporation, the earthy carbonates are precipitated, while the alkaline carbonates remain dissolved, and are discovered by their power of changing the yellow colour of turmeric to a brown.

These acids are usually combined with soda, lime or magnesia; and to complete the analysis by the application of tests, these bases must be discriminated.

Lime is detected, with the greatest delicacy of effect, by oxalic acid. The acid indeed with which the lime is combined in the water, when evolved by the action of the oxalic acid, is liable to re-act on the precipitate, and retain it in part dissolved; but this may be guarded against by using oxalate of potash. Magnesia is precipitated by the same acid; but this can scarcely give rise

to any fallacy, as this precipitation takes place very slowly, while that with lime is immediate.

Magnesia is precipitated by ammonia partially, and by lime water entirely; the principal fallacy to which both tests are liable is, that argil is also precipitated by them, and though this earth is not of very common occurrence in mineral waters, it is occasionally found. The best method of distinguishing them is to dry the precipitate, and boil gently a solution of potash on it, this dissolving argil, but leaving magnesia undissolved. Succinate of ammonia, it has lately been discovered, precipitates argil, but not magnesia. In using lime water as the precipitant, it is necessary to guard against the fallacy that may arise from the presence of carbonic acid free or combined, with which the lime may unite, and form a precipitate: this may be avoided by removing any carbonic acid by the previous addition of a little nitric acid. Any sulphuric acid also that may be present ought to be removed by nitrate of barytes, as it might unite with the lime, and give rise to a precipitate of sulphate of lime.

Soda, which is the alkaline base almost exclusively found in mineral waters, cannot be discovered by any test, such as that by which we discriminate the preceding ingredients. The presence of it, therefore, is inferred, when the analysis discovers acids in the water, which are not uncombined, and which, at the same time, cannot be inferred from the application of tests to be in combination with earthy bases. It is also discovered in its state of combination with any of the usual acids by evaporation, carried so far, that its salts are obtained crystallized. By the same method the other compound salts, those having lime, magnesia, or argil, for their base, are discovered, and hence evaporation is always employed in combination with the use of tests in conducting the analysis of a mineral water. Different substances separate at different stages of the evaporation, according to their degrees of solubility: the earthy carbonates are usually first precipitated, afterwards the

earthy sulphates, at least the sulphate of lime: the clear liquor poured off and allowed to cool, affords the alkaline neutral salts and sulphate of magnesia by crystallization; the muriates of magnesia and lime usually remain dissolved in the residual liquor, and by these separations the analysis is facilitated.

Advantage is also taken of the powers of alkohol, both as a solvent and as a precipitant, to separate these substances. When the water is reduced to a concentrated state by evaporation, the addition of alkohol throws down certain salts, while others remain dissolved; and of those which are precipitated, some are thrown down by a small quantity of alkohol, or when the evaporation has not been carried far; while others are separated only when the alkohol is added in larger proportion, or when the water is farther evaporated. Thus, sulphate of lime is first precipitated, then carbonate of lime and carbonate of magnesia, afterwards, sulphate of soda and sulphate of magnesia, while the muriates in general remain dissolved. In applying the solvent power of alkohol to facilitate the analysis, the water is evaporated to dryness, and this dry matter is submitted to the action of alkohol; the muriates which are present are in general dissolved, while the sulphates and carbonates remain undissolved.

By these operations, too, the quantities of the respective salts contained in a water are determined; the substances separated being either brought to a certain state of dryness, or being dissolved separately in water and crystallized. The quantities are sometimes inferred, too, by estimation from the precipitates afforded by re-agents; the quantity of sulphuric acid, for example, being determined from the weight of the precipitate of sulphate of barytes, obtained by the addition of muriate of barytes; that of muriatic acid from the weight of the precipitate of muriate of silver, obtained by the addition of nitrate of silver; and that of lime from the weight of the precipitate of oxalate of lime; these quantities being inferred according to the composition of these compounds, as they have been determined by the most accurate ex-

periments. In general, these methods require to be combined to insure accuracy, especially with regard to the determination of proportions.

At the same time, it may be doubted, whether the view, which has usually been given with regard to the state in which these substances exist in mineral waters, is just. It has been supposed, that they are dissolved in the water in those forms of binary combination in which they are obtained by evaporation or precipitation; that if muriate of soda, for example, sulphate of magnesia, and carbonate of lime are obtained by these methods, the mineral water held these salts dissolved. Of this, however, there is no proof, and the most correct views of chemical affinity rather lead to the conclusion, that the different acids and different bases exist with their affinities balanced, contributing to mutual neutralization, in simultaneous combination, and that these binary compounds are established only by the exertion of the force of cohesion, and are therefore actually formed by the processes by which they are obtained. If this view be just, the only conclusion that can strictly be drawn from the analysis is, that certain acids and certain bases exist in the mineral water, and it may appear to be superfluous to attempt to determine the quantities of the binary compounds. Still, as reducing the estimation to a standard, this is as useful as any other mode: it corresponds more directly with the results of the experiments which have been hitherto made, and we can, if necessary, infer from the quantities thus determined of the secondary compounds, the proportions of the primary principles.

Saline Mineral Waters are usually aperient, the substances which they hold dissolved being either so far as can be determined inert, such as the sulphate and carbonate of lime, or being cathartic, as the greater number of the other compound salts. It has always been remarked, too, with regard to them, that their cathartic power is greater than could be supposed from the extent of their saline impregnation, as determined by ana-

lysis; a proof of the influence of dilution in the operation of mineral waters. They are usually employed in diseases where it is of advantage to stimulate the digestive system, the intestinal canal, and the secreting organs connected with it, or where advantage is derived from moderate and continued evacuations. Hence their celebrity in the treatment of some forms of dyspepsia and hypochondriasis, chlorosis, chronic hepatitis, jaundice, and in scrofula. The most noted saline water is that of Sedlitz: that of Seltzer, along with a portion of saline matter, has a large impregnation of carbonic acid, and that of Cheltenham, an impregnation both of carbonic acid and iron.

When these waters are impregnated with carbonic acid, which they frequently are, they become more grateful, and sit easier on the stomach. When they have an impregnation of iron, they acquire tonic powers, and more efficacy as remedies in amenorrhœa, and the other chronic diseases in which this metal is employed.

Sea Water, in strict chemical arrangement, must be regarded as belonging to the class of saline mineral waters, as it holds dissolved merely various neutral salts, chiefly muriate of soda and of magnesia, and sulphate of soda and magnesia, with a little sulphate of lime. It much exceeds, however, in the extent of impregnation, any common mineral water: the proportion of saline matter varies in different latitudes, according to the temperature, producing greater or less evaporation, and it is liable to be varied by the discharge of large rivers into the ocean. But, on an average, the quantity appears to be about $\frac{1}{29}$, of which, from the experiments of Bergman and Lavoisier, it appears, that about 20 are muriate of soda, 5 muriate of magnesia, 3 sulphates of magnesia and soda, and 1 sulphate of lime. Its medicinal powers are similar to those of the saline mineral waters; from the extent of its saline impregnation, it is more active as a cathartic, and this renders it more stimulating than fresh water as a bath.

IV. Chalybeate Mineral Waters.—These owe their characteristic properties, chemical and medicinal, to an impregnation of *Iron*. The oxide of iron is almost uniformly held dissolved by carbonic acid, the acid being usually in excess; in a few mineral waters, sulphate of iron is present; but these are rare, and are in general too active to be well adapted to medicinal use.

Chalybeate waters have a peculiar styptic taste; they are transparent when taken from the spring, but when exposed for some time to the air, a pellicle forms on the surface, and a quantity, generally minute, of ochry sediment subsides, the water at the same time losing its taste; this change is accelerated by heat.

Iron is discovered, with great facility, by chemical tests. Prussiate of potash detects it by the blue colour to which it gives rise; infusion of galls by the purple colour which it strikes. The latter test is more delicate than the former, and it is much more accurate; the prussiate of potash being always liable to fallacy, from the difficulty of obtaining it free from iron; hence the infusion of galls, or rather the tincture of galls, ought always to be preferred. The principal circumstance to be remarked with regard to its operation, is, that the purple colour which it strikes, by the gallic acid and tannin of the infusion combining with the oxide of iron, is liable to be altered in its tint by the presence of other substances: alkaline and earthy carbonates in particular render it violet: neutral alkaline salts appear to deepen the purple colour, and sulphate of lime renders the precipitate at first whitish, and afterwards black. Carbonate of lime has a singular effect: if the iron is in a low state of oxidation, it heightens the colour; but when the oxidation is greater, it has the opposite effect; and if the quantity of iron be small, the colour may even not appear on the addition of the test. This fact, discovered by Mr. Phillips, enabled him to explain a singular circumstance with regard to the Bath Mineral Water,—that when newly taken from the spring, and while still warm, it gives a purple

colour with galls, indicating the presence of iron; while, after exposure for a little time to the air, no colour appears, though no oxide of iron has been precipitated.

By applying the test of galls before and after boiling the mineral water, we are enabled to discover whether the iron is held dissolved by carbonic or sulphuric acid; the carbonic acid being expelled by the ebullition, and the oxide of iron precipitated, so that after filtration of the liquor when cold, the purple colour does not appear; while the sulphate, though likewise partially decomposed by the ebullition, still so far remains, that a colour not much fainter will be produced. The presence of carbonic or sulphuric acid may also be determined by their usual tests, and sulphate of iron may be obtained by evaporation.

The quantity of oxide of iron may be determined from its precipitation, on exposure to the air; the whole or very nearly the whole of it, when it is combined with carbonic acid, being precipitated, in consequence partly of the escape of the acid, and partly of the iron passing to a higher state of oxidation, so that its attraction to the acid becomes weaker. It has also been estimated from the weight of the precipitate, formed by the addition of prussiate of potash; or, by a more recent and less exceptionable mode, precipitating it by the addition of succinate of soda, and afterwards decomposing the precipitate of succinate of iron, by exposing it to a red heat with a little carbonaceous matter, 100 parts of the oxide obtained by the calcination containing about 70 of iron.

Chalybeate mineral waters are remedies of considerable activity and power. They act as tonics, increasing the strength of the system, raising the force of the circulation, giving tone to the digestive organs, augmenting muscular vigour, and promoting the excretions. They are of course employed in those diseases in which iron is principally used, amenorrhœa, chlorosis, some states of menorrhagia, leucorrhœa, dyspepsia, scrofula, and various forms of chronic debility. And as iron al-

ways succeeds best when given in small doses, and in a state of considerable dilution, the chalybeate waters afford the best form under which it can be prescribed, that which is at once attended with least irritation, and from which the greatest benefit is obtained. The powers of these waters, too, are often aided by the presence of other ingredients. The impregnation of carbonic acid, when it is present in excess, gives them a grateful stimulant quality, which is exerted on the stomach; and saline substances communicate to them an aperient power.

One of the purest chalybeate waters, as will be perceived from the annexed table, is that of Tunbridge. In the celebrated Spa and Pyrmont waters, the impregnation of carbonic acid is so great, as very materially to modify the action of the iron; and in the Cheltenham water, the quantity of active saline matter is such, that it can scarcely be regarded as a chalybeate.

Besides the substances which have been enumerated as forming the preceding classes of mineral waters, there are some principles common to all of them, so as to be occasionally found in those of each class; and there are some also, which are of very rare occurrence, either of which scarcely require more than a concise enumeration.

Atmospheric air is contained in all water that flows at the surface of the earth, and renders it more grateful and light as drink. It scarcely in its entire state appears to be contained in more than the usual proportion in any mineral water, while in those in which other elastic fluids are present in large quantity, it is probably deficient. Neither does it appear that *Oxygen* gas is ever present in a proportion larger than that in which it exists, as a constituent of the atmospheric air in water. The fact, rather singular, has been established, however, that *Nitrogen* gas is afforded by mineral springs. It had often been observed, that, in the mineral spring at Buxton, a quantity of elastic fluid was discharged with the water, and a portion escaped on exposure from the water itself.

This was supposed to be carbonic acid; but Dr. Pearson discovered it to be nitrogen gas, mixed with a little atmospheric air, the volume of air amounting to about $\frac{1}{64}$ of the water. It was afterwards discovered by Dr. Garnet in the mineral waters of Harrowgate.

Sulphurous acid gas has been found in some hot mineral waters in the neighbourhood of volcanoes, but is scarcely to be looked for in any other situation. The *Mineral acids* have likewise, though rarely, been found uncombined, or at least in excess. *Sulphate of Argil* and *Sulphate of Iron* sometimes occur, arising probably from the oxygenation of aluminous slate impregnated with sulphuret of iron, through which the water has passed. *Muriate of Manganese* has been detected in minute quantity. Lastly, *Silex* exists in solution, especially in hot springs. It is deposited abundantly from the water of the Geyser fountain in Iceland. It is dissolved in the water of the hot springs of Carlsbad, and Dr. Gibbes found it in the Bath waters.

The temperature of mineral waters gives rise to a very important distinction among them. The greater number are at the average annual temperature of the place where the spring is situated; others are considerable superior to this, or are positively warm. This modifies their powers. The warmth of the tepid waters renders them rather more stimulating when swallowed, a glow of warmth being felt in the stomach, and sometimes the head is slightly affected. Externally applied under the form of the bath, the temperature has even a more important influence on their operation, than any impregnation they may have. In some celebrated mineral springs, the salutary powers appear to depend principally or entirely on the temperature, and on the water acting as a diluent, as in the warm mineral waters of Bristol, Matlock, and Buxton, and in the cold spring of Malvern.

In the following table is presented the results of the analysis of the most celebrated mineral waters. I have

arranged them as nearly as possible according to the preceding classes, though there is considerable difficulty with regard to some of them, which, from the substances they hold dissolved, belong to one class as well as to another. Thus the Spa and Pyrmont waters belong both to the classes of carbonated and chalybeate waters. I have placed them under the former, as the impregnation of carbonic acid is so very considerable, and gives them perhaps their most important properties. Cheltenham water may be placed either as a saline or as a chalybeate water. I have given it the former rank, as the saline matter appears to give it its principal activity. To the four established classes I have added a fifth, those of Pure Waters, or waters so free from any foreign matter that their operation must be ascribed to the fluid acting partly by its temperature, and partly as a diluent. In some of these the analysis indicates a certain portion of foreign matter. But the substances are in general not different from those in common spring water, and are in smaller quantity. I have therefore supposed that they may be arranged under this class, nor have they any of the active powers of the others. There is some difficulty in assigning the place of one of the most celebrated mineral waters, the Bath Water. I have placed it, however, at the head of the pure waters, and immediately after the chalybeate waters, as the impregnation of active matter is inconsiderable, and its operation seems principally dependent on dilution and temperature, modified a little perhaps by the tonic quality of the small portion of carbonate of iron. I have inserted the latest analysis of it, that by Mr. Phillips. With regard to the temperature, I have thought it sufficient to add the epithet cold, where the temperature is not above that of the external atmosphere; where it exceeds this, I have added the precise degrees. The proportions of the ingredients are those contained in a wine gallon of the water.

WATERS.		Nitrogen.	Carbonic acid gas.	Sulphuretted hydrogen gas.	Carbonate of Soda.	Carbonate of Magnesia.	Carbonate of Lime.	Sulphate of Soda.	Sulphate of Magnesia.	Sulphate of Lime.	Muriate of Soda.	Muriate of Magnesia.	Muriate of Lime.	Oxide of Iron.	Silex.	Temperature.
			cub. in.	cub. in.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grs.	
Carbonated.	Seltzer,		138		32	40	24				140					Cold.
	Pyrmont,		208			80	34.8		44.5	68.6	12.4			4 5		Cold.
	Spa,		104		11.7	35.3	11.7				1.37			4.5		Cold.
	Carlsbad,		32 to 50		39		12	70			34.6			0.125	2.5	165°
Sulphureous.	Harrowgate	7	8	19		5.5	18.5		10.5		615.5	91	13			Cold.
	Moffat,	4	5	10							36					Cold.
	Aix le Chap.			Supersulphuretted hydrogen.	90		38				40					143°
Saline.	Sedlitz,		8			21	6.7		1444	41.1		36.5				Cold.
	Cheltenham,	12.	30.3	3		12.5		480		40	5	12.5		5		Cold.
	Plombieres,				4.4		1	4.7			0.5				2.6	
Chalybeate.	Tunbridge,	5	10.6							1.25	0.5	2.2		1		Cold.
	Brighton,		18							32.7	12.2	6		Sulphate of Iron. 11.2	1.12	Cold.
Pure.	Bath,		9.6				6.4	12		72	26.4			.016	1.6	116
	Buxton,	2					10.5			2.5	1.7			0.25		82°
	Bristol,		30				13.5	11.2		11.7	4	7.25				74°
	Matlock,															66°
	Malvern,															Cold.

The practicability of imitating the mineral waters has engaged the attention of chemists. With regard to the active saline waters, it is easily done, by dissolving the due proportions of the compound salts in water corresponding to the analysis of the water designed to be imitated. We may also impregnate the solution with carbonic acid gas, and even with sulphuretted hydrogen; and by the medium of carbonic acid, it might receive an impregnation of iron. Directions for conducting these processes have been given by Bergman. But in all these cases, there will be wanting the confidence on the part of the patient in the efficacy of the artificial water, which, if not necessary to its success, is at least requisite to its continued and regular use: the external advantages too, attending the visit to a mineral spring, may not always be obtained. Hence these artificial waters, designed as substitutes for the natural ones, have never been established in use. Water, impregnated with carbonic acid, with the addition of an alkaline carbonate, which is now in general use, may be considered as operating on a similar principle; and to this super-carbonated soda, or super-carbonated potash water, a small quantity of any of the purgative salts is often added with advantage, communicating to the water an aperient quality, while the taste of the salt is covered, and it is rendered more grateful to the stomach.

II. OF THE GASES EMPLOYED AS REMEDIES.

Substances existing in the aërial form might *a priori* be supposed capable of producing important effects on the system, as by respiration they are brought to act directly on the mass of blood, and induce in it chemical changes. They occasion too immediate and important alterations in the functions of life, some of them producing the highest excitement, others occasioning depression and exhaustion of power.

Though the expectations that were at one time formed, with regard to their medicinal efficacy, have not been realized, and the use of them has now been nearly relinquished; yet since they are capable of producing such changes in the state of the functions, and of the general system, and since the proposition must be admitted, that every substance possessed of these powers may be capable of producing medicinal effects, they ought not to be entirely lost sight of, or be discarded from the Materia Medica. In the aërial kingdom, we have actually the two extremes of Stimulant and Sedative Power, in the examples of nitrous oxide and carburetted hydrogen.

The modes of preparing these gases are, in a great measure, peculiar to each of them. The manner of administering them is nearly the same. They may be breathed from a jar placed in water; but this is laborious, from the effort required to sustain the column of water within the jar. This may be partly remedied, by poising the jar in water, or, more completely, by breathing from the gazometer. But the easiest mode is, for the patient to breathe the gas from a silk bag, to which a tube with a stop-cock is affixed.

The gases that have been employed in medicine, may be considered under the divisions of those which *excite*, and those which *depress* the functions of life. To the former order belong,

GAS OXYGENIUM. Oxygen Gas.
GAS OXIDUM NITROSUM. Nitrous Oxide Gas.

Oxygen gas is procured from black oxide of manganese by heat. A quantity of the oxide is put into an iron retort, connected by a tube with a gas holder, or a large jar filled with water, inverted and placed on the shelf of the pneumatic trough. The retort is exposed to a full red heat; at this temperature the affinity of the oxygen to the manganese is so far weakened by the repulsive agency of the caloric, that a large portion of it is separated from the combination, and assumes the elastic form: the gas is transmitted through water, and is allowed to stand over it for some hours before it is breathed.

As oxygen is so immediately necessary to the support of life, it might be supposed, that when afforded in a more pure and concentrated state than that in which we breathe it in atmospheric air, it would prove a salutary agent of no inconsiderable power. To this inference, however, independent of any experience, an objection occurs, founded on some experiments made by Lavoisier, and repeated by Davy, which appear to prove, that when animals are supplied with pure oxygen, or with oxygen mixed with a portion of atmospheric air, less of it is actually consumed than in ordinary respiration. This result appears, however, to have arisen from some fallacy in the experiments. Seguin, in subsequent experiments, found that the consumption of oxygen gas, when it is breathed pure, is at least equal to its consumption in ordinary respiration. And more lately, Messrs. Allen and Pepys have found that in breathing pure oxygen gas, more of it is consumed in a given time, and more carbonic acid formed, than in breathing atmospheric air; they also observed a diminution in the volume of air, or the disappearance of a portion of it; whence they inferred, that, when oxygen is breathed pure, a quantity of it is absorbed by the blood. The positive action of oxygen, in the respiration of it, in its undiluted form, is also shown by the effects which result

from its inspiration, and still more unequivocally by the fact ascertained by Priestley, Lavoisier, and Davy, that animals confined in air, with an increased proportion of oxygen, die before it is exhausted, and even while the air which they breathe contains more oxygen than common air, and can enable another animal to live. It is obvious, therefore, that the animal dies not from deprivation of oxygen, but from some positive power the gas exerts, and probably, as may be inferred, from some appearances which present themselves, from its too highly stimulating power.

Oxygen, when respired, acts partly by communicating a stimulating quality to the blood, by which the left side of the heart and the arterial system are excited to action: hence, when its supply by respiration is suspended, the contractions of the heart become feeble, and at length cease, as Goodwyn demonstrated. The phenomena of asphyxia from its abstraction, prove that it likewise exerts some other operation more immediately subservient to the functions of life; for in that disease the functions of life are suspended, while the contractions of the heart still continue, to a certain extent, as the experiments of Coleman have shown.

The diseases in which oxygen gas has been administered, are principally those of chronic debility,—chlorosis, asthma, scrofula, dropsy, paralysis, and some cutaneous affections. It requires to be diluted with from ten to twenty or more parts of atmospheric air, increasing the proportion of oxygen according to the effects produced. From one to two quarts of oxygen are given, by breathing it in its diluted state, at intervals, in the course of the day. It generally increases the force and velocity of the pulse.

Nitrous oxide gas.—This gas, a compound of oxygen and azote, in the proportion of 37 of the former to 63 of the latter, is most economically obtained, and in greatest purity, from the decomposition of nitrate of ammonia by heat. When this salt is exposed to a tempera-

ture about 400° of Fahrenheit's scale, its principles react on each other, and enter into new combinations. The hydrogen of the ammonia attracts part of the oxygen of the nitric acid and forms water; and the remaining oxygen combining with the azote, both of the acid and of the ammonia, forms this particular compound, nitrous oxide, which is disengaged in the gaseous form. After its production it requires to stand some hours, to deposite a small portion of saline matter, before it is fit to be breathed.

The effects of nitrous oxide gas on the system, when it is respired, are scarcely analogous to those of any other agent. The excitement which it produces is extended to the functions of body and mind with more rapidity and force than that arising from the action of the most powerful stimulants. It is accompanied, too, with effects as various as they are peculiar; it excites usually a peculiar thrilling of the body, with feelings of pleasure not easily described: muscular vigour is increased, so that unusual exertions are made with alacrity and ease, and there is even an irresistible propensity to strong muscular exertion; the mind is also affected: there is usually a high degree of exhilaration, yet even when this is greatest, perfect consciousness remains. What still more marks the singularity of its operation, this high excitement of the functions of life and exhilaration of mind are not followed by proportional languor or debility; the state of the system gradually returns to the healthy standard, without any apparent waste of power. A substance capable of acting in such a manner, we might suppose, would prove one of our most valuable remedies. The transient nature of its operation must undoubtedly limit its medicinal efficacy; but still, in diseases of extreme debility, we seem justified in expecting from its administration the most beneficial effects. It has not, however, been very extensively employed. In paralysis it has been used with advantage. In diseases of increased sensibility, it may prove hurtful; and when breathed by delicate females, it has, in

more than one case, induced hysteric affections. The dose which is requisite to produce its peculiar effects varies from four to nine quarts, which may be breathed pure or diluted with an equal part of atmospheric air. It cannot be breathed undiluted for more than four minutes and a half, insensibility being induced. And it requires to be attended to in its administration, that its effects are considerably different in different individuals. On some, its operation has even been productive of unpleasant consequences,—palpitation, fainting, and convulsions.

Nothing satisfactory can be said as to its mode of action, since we know so little of the connection which subsists between the phenomena of life and the chemical changes which are carried on in the system. The experiments of Mr. Davy appear to prove, that it is absorbed by the blood when respired; but, admitting this, we can discover nothing connected with its composition or chemical agency which can lead us to any explanation of its peculiar effects. We can therefore only mark the dissimilarity of its operation to that of any other physical agent.

UNDER the second subdivision of the Gases, those which depress the functions of life, might probably be placed all the substances existing in the aërial form, oxygen and nitrous oxide excepted. The following are those which have been medicinally employed:

GAS HYDROGENIUM. Hydrogen Gas.
GAS NITROGENIUM. Nitrogen Gas.
GAS ACIDUM CARBONICUM. Carbonic Acid Gas.
GAS HYDROGENIUM CARBURETUM. Carburetted Hydrogen Gas.

HYDROGEN GAS is most easily procured by the action of diluted sulphuric acid on iron or zinc; but as a little acid vapour might be diffused through it, it has been supposed preferable to obtain it, when it is designed to be breathed, by passing water in vapour over pure iron heated to the temperature of ignition. The iron attracts

the oxygen of the water, and the hydrogen assumes the aërial form.

Hydrogen gas received into the lungs does not appear to exert any positive deleterious power: all its effects seem referable merely to the exclusion of oxygen. The respiration of it can accordingly be continued for some time, if it is mixed with a portion of atmospheric air, without any deleterious effect. In a pure state, however, if the lungs have been previously emptied as much as possible of atmospheric air, it cannot be breathed but for a very short time. It quickly occasions a giddiness and sense of suffocation; the countenance becomes livid, and the pulse sinks rapidly, and a state of insensibility is soon induced. When diluted with two thirds or an equal part of atmospheric air, it can be safely breathed; nor does it appear to produce any very important effect. It occasions some diminution of muscular power and sensibility, and a reduction of the force of the circulation. It has been respired, diluted usually with four or five parts of atmospheric air, in catarrh, hæmoptysis, and phthisis; but its powers seem merely those of a palliative, dependent on the partial exclusion of the stimulating power of oxygen.

Nitrogen.—What has been said of hydrogen applies likewise to nitrogen. It seems to exert no positive action on the system, but to produce any effects arising from its inspiration merely by excluding oxygen. As it is not so easily obtained pure as hydrogen gas, it has scarcely, if at all, been employed.

Carbonic acid gas.—This gas is easily procured from the action of diluted sulphuric or muriatic acid on carbonate of lime (chalk or marble); but to obtain it in a proper state of purity for breathing, it is preferable to decompose the carbonate of lime by exposure to a strong red heat in an iron bottle. The carbonic acid which is disengaged is collected over water, as it is not immedi-

ately largely absorbed by that fluid, and any vapour diffused through it is speedily condensed.

This acid gas, when it is inspired, proves more speedily fatal than nitrogen or hydrogen. It appears, from Mr. Davy's experiments on its respiration, to excite spasmodic contraction of the epiglottis, so as to induce suffocation; and it has this effect, even when diluted with nearly an equal part of atmospheric air. Yet the operation of it is more speedily fatal than that of any other agent that acts by occasioning merely suffocation, which would lead to the supposition that it acts by some positive power,—a supposition confirmed too by the fact, that in animals, in whom the symptoms of life have been suspended by its respiration, the irritability of the heart is entirely destroyed.

The respiration of carbonic acid gas was employed at an earlier period than that of the other gases, and sanguine expectations were formed of it as a remedy in phthisis. In the many cases, however, in which it has been tried, though it frequently proved useful for a time, by lessening the expectoration, diminishing the hectic fever, and acting as an anodyne, there is little evidence of its having ultimately effected a cure. The difficulty, indeed, of employing this and all the other gases, is, that of obtaining their continued operation. In that state of disease existing in the lungs, in the earlier stages of phthisis, much advantage, for example, might probably be derived from the continued respiration of a reduced atmosphere, while little can be expected merely from its occasional operation. Carbonic acid gas, when employed, was respired diluted with four or six parts of atmospheric air.

Carbonic acid has likewise been employed as a local application to cancer and painful ulceration, and has at least been serviceable as a palliative. A stream of it is directed on the part by means of a flexible tube, taking care to transmit the gas previously through water, if it has been obtained by the action of an acid of carbonate of lime, and confining it for some time over the sore by

a funnel connected with the tube. A cataplasm, formed of substances in a state of fermentation, has, in some measure, a similar effect, and is more convenient in its application. A formula for this preparation has now a place in the London Pharmacopœia.

Carburetted hydrogen gas.—The gas which has been used in medicine under this name is obtained by passing the vapour of water over charcoal at the temperature of ignition, in an iron tube. The oxygen of the water unites with one part of the charcoal, forming carbonic acid; the hydrogen combines with another part of it, and forms this species of carburetted hydrogen. The carbonic acid is abstracted by agitating the gas in lime water.

This is the most active of those gases which operate by depressing the functions of life, and is perhaps the most powerful agent of this kind. Even when largely diluted with atmospheric air, it occasions immediate vertigo, sickness, diminution of the force and velocity of the pulse, reduction of muscular vigour, and in general every symptom of diminished power. It can scarcely be breathed in an undiluted state. Mr. Davy found, that at the third inspiration, total insensibility was induced, and symptoms of extreme debility continued for a considerable time. These effects prove its positive deleterious agency.

As a medicinal agent, it is the gas of which the evidence in favour of its efficacy is greatest. In phthisis, in many cases, it unequivocally relieved the symptoms, and at least arrested the progress of the disease; and in diseases of increased action or increased power, much benefit might, from its known operation, be expected from its use. Much caution was found to be requisite in the trials that were made of it, with regard to the dose. At first, one pint of the carburetted hydrogen gas, diluted with twenty parts of atmospheric air, may be respired; the quantity may be slowly increased, and with less dilution, taking care to avoid the production of great vertigo

or muscular debility. Not more than from two to four quarts can be taken in the day, even when the patient has been accustomed to it for some time. It is always more powerful when recently prepared, than when it has been kept for some days, a circumstance requiring to be attended to in the regulation of its dose.

An application of the aërial fluids connected with medicine, is that of neutralizing or destroying noxious or contagious effluvia. These effluvia are probably evolved by chemical processes, and must consist of principles in forms of combination subject to chemical agency. It has accordingly been found, that the air of places offensive from the presence of such effluvia is corrected, and its freshness restored, by the diffusion of those acid gases, the operation of which, in changing the chemical constitution of compound elastic fluids, is most powerful. These are Oxy-muriatic Acid Gas and Nitric Oxide Gas. The power of the former in producing these effects appears, from the evidence brought forward by Guyton, to be unquestionable: considerable benefit appears, likewise, from the reports of Dr. Carmichael Smyth, to be derived from the latter. It is however probably inferior to the oxy-muriatic acid gas in activity; but it has the advantage, that fumigation with it in the wards of an hospital, or in similar instances, may be had recourse to without the removal of the sick. The one is disengaged from a mixture of muriate of soda, black oxide of manganese, and sulphuric acid; the other from nitre and sulphuric acid, the mixture being put in small earthen cups, and a moderate heat applied to favour the disengagement of the gas.

ELECTRICITY.

The medicinal operation of electricity may be referred to its stimulating power. It produces forcible contractions in the muscular fibre; excites therefore to action, if duly applied, and, when in excess, immediately exhausts irritability. It possesses the important advantages of being easily brought to act locally, and of being confined to the part to which it is applied, without at all affecting the general system, while it can also be employed in every degree of force.

Electricity is applied medicinally under the form of the stream or continued discharge of the fluid, under that of sparks, and under that of a shock; the first being the most gentle, the second being more active, and the last being much more powerful than either of the others. The stream is applied by connecting a pointed piece of wood, or a metal wire, with the prime conductor of the electrical machine, and holding it by an insulated rod one or two inches distant from the part to which it is to be directed. A very moderate stimulant operation is thus excited, which is better adapted to some particular cases than the more powerful spark or shock. The spark is drawn either by applying a metallic knob connected with a rod in communication with the machine, the operator holding it by a glass handle; or by placing the patient on an insulated stool connected with the prime conductor, and, while the machine is worked, bringing a metal knob within a short distance of the part from which the spark is to be taken; a sensation somewhat pungent is excited, and slight muscular contractions may be produced; these effects being greater or less, according as the spark is more powerful, this being regulated by the distance at which the knob is held, if the machine be sufficiently in action. The shock is given by discharging the Leyden phial, making the part of the body through which it is intended to be transmitted part of the cir-

cuit. The shock is of course stronger as the phial is large, and as it is fully or partially charged; the sensation it excites is unpleasant, and the muscular contractions considerable, if it is of moderate intensity.

At the first introduction of electricity as a remedy, it was very highly celebrated for its efficacy in a number of diseases; its use is now confined to a few. In paralysis it is not unfrequently had recourse to, to excite muscular contraction, and perhaps with some advantage. It is usually applied under the form of sparks, the application of it requiring to be continued daily for a considerable time. Sometimes moderate shocks are also employed; but the propriety of this practice is somewhat doubtful. In amenorrhœa, as the stimulant operation can be excited, in some measure, in the vessels which are affected, advantage may be derived from electricity; and it is occasionally used, both under the form of sparks taken from the pelvis, and that of moderate shocks transmitted through it. Ophthalmia, and some other varieties of inflammation, have been removed by the electric stream; it has also sometimes succeeded in discussing tumours, and relieving pain. The general rule for the medical employment of electricity is to apply it at first under the milder forms, and gradually to raise it, if necessary, to the more powerful, taking care only not to employ it in too high a state of intensity, but in the greater number of cases rather to expect advantage from its continued and moderate use. In the treatment of paralysis, for example, by the application of electricity, the only rational indication is to excite moderate muscular action with the view of increasing the muscular power; to this, sparks of sufficient strength are adequate, and in employing shocks, there is always some risk of exhausting the irritability of the part through which they are transmitted.

GALVANISM.

The peculiar power which is generated when two metals moistened or acted on by certain chemical liquids are in contact, at first named Animal Electricity, since Galvanism, has been applied as a remedy in various morbid affections. Its effects on the animal system are such as warrant this application. Its activity is shown by its exciting, when applied in sufficient intensity, strong sensations in sensible parts, and powerful contractions in parts endowed with irritability.

Between galvanism and electricity there are so many points of resemblance, that they have been considered as ultimately the same power, and there is every reason to admit their identity. Still from the different states in which they exist, their effects on living matter are not precisely similar. The sensation which galvanism excites, though somewhat analogous to that produced by electricity, is still dissimilar; and the action of galvanism appears to be more extended, both to the nervous and muscular systems, than that of electricity, which is more local in its action. The galvanic excitation produces sensations and contractions in parts, which, from disease, or temporary suspension of power, are not sensible to electrical impressions; and the stimulant power which both exert, appears in galvanism to be greater in proportion to its intensity than in electricity; or the sensations and muscular contractions which the galvanic discharge excites, are more than proportional to its power of producing electrical phenomena. Hence it is the most delicate test by which the presence of irritability can be detected.

The diseases in which galvanism has hitherto been employed, are principally those of the nervous kind. In paralysis, it has been affirmed to have restored the capability of muscular contraction, and consequently the power of motion. Cases of chorea, tetanus, and some

other spasmodic affections, have been related, in which perfect cures were accomplished by its application. It appears, in several instances, to have relieved deafness, particularly that species of it arising from torpor of the auditory nerve; and it has been successful in discussing indolent tumors. The transient nature of the operation is, with regard to it, as well as electricity, an obstacle to their advantageous application.

Galvanism is applied by connecting two metallic wires with the two extremities of a galvanic battery, and bringing them in contact with the part affected, so that it shall form part of the circuit of the galvanic discharge: the one wire is kept in contact with the part it touches; the other is alternately applied for a moment, and removed, and this is continued for some time. If the skin is moistened, the galvanic influence is communicated more readily and effectually; and still more so if a small piece of metallic leaf, as tinfoil, be laid on the parts to which the wires are applied. Sometimes even the cuticle has been previously removed by a blister, but the application of the galvanism is then attended with pain, and this is altogether unnecessary, if a galvanic apparatus of sufficient power be employed. One constructed of plates of zinc and copper, four inches square, and including from 25 to 50 of each metal, is sufficient for the greater number of purposes, a greater or less number of the plates being included in the circuit, according to the strength of the application required. The liquid best adapted to excite it is a solution of muriate in soda, with a little muriatic acid; diluted nitric acid, though rather more powerful, having its power sooner exhausted.

ON MEDICAL PRESCRIPTIONS.

THE principal objects designed to be attained by the Composition of Medicines, are, to communicate an agreeable taste or flavour; to give a convenient form; to correct the operation of the principal medicine, or obviate some unpleasant symptom it is liable to produce; to promote its action, by the substance combined with it exerting one of a similar kind; to obtain the joint operation of two remedies, which have different powers, but which may be required to obviate different morbid symptoms present together; or, lastly, to change their usual effects, and obtain a remedy different from either, by the power which one may have of modifying the action of another.

A prescription has been usually divided into four parts, which compose it,—the *basis*, or principal ingredient of the prescription; the *adjuvans*, or that which is designed to promote the action of the former; the *corrigens*, or that intended to correct its operation, or obviate any unpleasant symptom which it may be apt to produce; and the *constituens*, or the substance which gives to the other ingredients consistence or form. These are not necessarily present in every formula, as some of these purposes may not require to be attained; nor is the division of much importance, except perhaps as affording the best general rule for regulating the order in which the ingredients of a prescription should be enumerated, the order being conformable to that which corresponds with this arrangement.

The following are the principal circumstances to be attended to in forming a prescription.

1*st*, Simplicity should be attained, so far as is consistent with the objects of the prescription. Nothing ought to enter into the composition which does not add to its virtue, render it less ungrateful, give it a convenient

form, or which is not necessary to conceal any particular ingredient; and, in general, the practice of accumulating a number of articles in one prescription is to be avoided, as there is always the risk of one counteracting or modifying the action of another, and the addition of less active substances can do little more than add to the bulk of the medicine, or cause it to sit uneasy on the stomach.

2*dly*, Substances, it is evident, ought not to be mixed together, which are capable of entering into chemical combination, or of decomposing each other, unless it be with the view of obtaining the product of the combination, or decomposition, as a remedy.

3*dly*, Those mixtures are also to be avoided, in which one medicine, by its peculiar action on the stomach or general system, modifies and changes the action usually exerted by another, unless where the object is to obtain the effects of that modified operation.

4*thly*, The error of contra-indication is to be guarded against, or those medicines ought not to be combined, the virtues of which are not merely different, but are, in some measure, opposed to each other,—an error not very likely to occur with regard to the principal ingredients of a prescription, but which may happen with regard to those of inferior importance.

5*thly*, The ingredients which are to be mixed, must be such as will mix properly together, so that the form in which the remedy is designed to be exhibited may be easily obtained and preserved.

Lastly, The form under which a medicine is prescribed must be adapted to certain circumstances; principally to the nature of the disease, the nature of the remedy itself, and, as far as can be conveniently attained, to the taste of the patient. Those medicines which are nauseous, which operate in a small dose, or which are designed to operate slowly, are usually given under the form of pill, or sometimes of bolus. Those which are less ungrateful, or the operation of which is designed to be immediately obtained, are given under some liquid

form. Tinctures always require to be diluted: infusions or decoctions may in general be given in the state in which they are prepared.

THE Doses of Medicines are not reducible to any general rules, from their general similarity of operation, or any other circumstance, and are therefore specific with regard to each substance. But there are certain general circumstances by which their operation is influenced, which require to be attended to in apportioning the dose. These are, Age, Sex, Temperament, Idiosyncrasy, Habit, and Disease.

Age.—From infancy to manhood, a larger dose of any medicine is requisite to produce its effect, in proportion to the advance in life. From manhood to old age, there is a similar gradation with regard to diminution of dose, though in a much less proportion than that which regulates the increase. The following table given by Gaubius has been supposed to show these proportions.

TABLE.

Let the dose for a person of middle age be		1 or 1 drachm.
For one from xiv to xxi years, it will be	-	$\frac{2}{3}$ or 2 scruples.
vii to xiv,	- - - -	$\frac{1}{2}$ or half a dr.
iv to vii,	- - - -	$\frac{1}{3}$ or 1 scruple.
of iv years of age,	- - -	$\frac{1}{4}$ or 15 grains.
iii	- - -	$\frac{1}{6}$ or half a scr.
ii	- - -	$\frac{1}{8}$ or 8 grains.
i	- - -	$\frac{1}{12}$ or 5 grains.

Sex.—Women, in general, require smaller doses of any medicine than men,—a difference which is probably owing principally to their greater sensibility from their habits of life.

Temperament.—By temperament is understood a predisposition, derived from original conformation, to be affected in a more peculiar manner by external causes

acting on the system; and much laborious investigation has been bestowed in distinguishing the different temperaments, and the diversities to which they give rise. Those of the sanguine temperament are supposed to be more affected by medicines, and therefore to require smaller doses than those of the phlegmatic or melancholic; but in what has been said on this subject there is so much uncertainty and hypothesis, that little reliance can be placed on it.

Idiosyncrasy.—This denotes that disposition in individuals, unconnected with general temperament, to be affected by certain causes, in a manner different from the generality of mankind. Such idiosyncrasies are observed with regard to medicines, as well as to other agents, and, where they are known, may require to be attended to by the prescriber.

Habit.—This has an important influence on the operation of medicines. In general, they lose part of their power by having been long continued, and the doses of them, therefore, require to be enlarged under their protracted use. This is particularly the case with all strong stimulants and narcotics, and is even observed, to a certain extent, in some of the other classes of the Materia Medica. In a few instances, the reverse has been supposed to hold true, as for example with regard to the saline cathartics.

Disease.—This has an influence on the doses of medicines not less important; the susceptibility to external impressions, and to action, being much varied in morbid affections, and the operations of remedies of course being modified by such variations. The state of susceptibility being in general apparent, when it varies much from the healthy standard, the doses of the medicines administered are regulated accordingly, and this, it is obvious, admits of no general observations, as being entirely dependent on the nature and state of disease.

TABLES

OF

CHANGED NAMES.

TABLES

OF

CHANGED NAMES

IN THE

NEW EDINBURGH AND LONDON PHARMACOPŒIAS.

In drawing up these Tables, it has not been thought necessary to insert the names of the Simple Medicines, as both the proper names of the articles, according to the nomenclature of natural history and their common or trivial names, are inserted in the index to the work; and thus the old or the new name of any simple substance may be easily found. In these Tables, therefore, the names of the Compound Medicines only are inserted, and the catalogue of them has been extended so far as to include not only the synonyms inserted in the present editions of the London and Edinburgh Pharmacopœias, but a number of older names, once generally established, and still occasionally used. I ought, in the body of the work, to have referred to the very just and forcible observations of Dr. Bostock, (Remarks on Pharmaceutical Nomenclature), on the inconvenience attending the innovations in the established language of Materia Medica and Pharmacy, as well as the impropriety of too strict an adherence to the nomenclature of chemistry, and of the adoption of the language of natural history, in the extent to which this has been carried by the Colleges in the late editions of their Pharmacopœias.

TABLE I.

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Acetum distillatum	Acidum acetosum distillatum	Acidum aceticum
Acidum vitriolicum	sulphuricum	sulphuricum
Ærugo æris	Sub-acetis cupri	Sub-acetas cupri impura
Æthiops mineralis	Sulphuretum hydrargyri nigrum	
Æther vitriolicus	Æther sulphuricus	Æther sulphuricus
Alkali fixum fossile	Soda	Soda
vegetabile	Potassa	Potassa
volatile	Ammonia	Ammonia
Alumen	Sulphas Aluminæ	Super-sulphas aluminæ et potassæ
Ammonia præparata	Carbonas ammoniæ	Ammoniæ carbonas
Antimonium	Sulphuretum antimonii	Antimonii sulphuretum
præparatum	præparatum	
calcareo-phosphoratum	Oxidum antimonii cum phosphate calcis	Pulvis antimonialis
muriatum	Murias antimonii	
tartarisatum	Tartris antimonii	Antimonium tartarizatum
vitrificatum	Oxidum antimonii cum sulphure	
Aqua ammoniæ acetatæ	Aqua acetitis ammoniæ	Liquor acetatis ammoniæ
causticæ	ammoniæ	ammoniæ
cupri vitriolati composita	Solutio sulphatis cupri composita	
fortis	Acidum nitrosum dilutum	Acidum nitrosum dilutum
lixivia caustica	Aqua potassæ	Liquor potassæ
lithargyri acetati		plumbi acetatis

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Aqua lithargyri acetati composita		Liquor plumbi acetatis dilutus
sappharina		Liquor cupri ammoniati
styptica	Solutio sulphatis cupri composita	
	vitrificatum	
Argentum nitratum	Nitras argenti	Argenti nitras
Balsamum canadense	Resina liquida pini balsameæ	Teribinthina canadensis
anodynum	Tinctura saponis cum opio	
saponaceum	saponis	Linimentum saponis compositum
sulphuris	Oleum sulphuratum	Oleum sulphuratum
traumaticum	Tinctura benzoes composita	Tinctura benzoini composita
Butyrum antimonii	Murias antimonii	
Calaminaris lapis	Carbonas zinci impurus	Calamina
Calomelas	Sub-murias hydrargyri	Hydrargyri sub-murias
Calx hydrargyri alba		Hydrargyrus præcipitatus albus
Causticum commune	Potassa	Potassa fusa
acerrimum	Potassa cum calce	Potassa cum calce
mitius	Carbonas calcis durior	
Cancrorum lapilli	Nitras argenti	Argenti nitras
Causticum lunare	Oxidum plumbi album	Plumbi carbonas
Cerussa	Acetis plumbi	super-acetas
Cerussa acetata	Sulphuretum hydrargyri rubrum	Hydrargyri sulphuretum rubrum
Cinnabaris factitia	Electuarium aromaticum	Confectio aromatica
Confectio cardiaca	catechu	
japonica		

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Crocus antimonii, vel crocus metallorum	Oxidum antimonii cum sulphure per nitratem potassæ	
Creta preparata	Carbonas calcis mollior	
Cuprum ammoniacum	Ammoniaretum cupri	Cuprum ammoniatum
vitriolatum	Sulphas cupri	Cupri sulphas
Crystalli tartari	Super-tartris potassæ	Potassæ super-tartras
Decoctum album		Mistura cornu usti
chamæmeli, vel commune	Decoctum anthemidis nobilis	
lignorum	guaiaci compositus	
pro enemate		malvæ compositum
fomento		papaveris
Elaterium	Succus spissatus momordicæ elaterii	
Electuarium lenitivum	Electuarium cassiæ sennæ	Confectio sennæ
thebaicum	opiatum	opii
Elixir paregoricum	Tinctura opii ammoniata	Camphoræ composita
proprietatis	aloes cum myrrha	Tinctura aloes composita
vitriolicum	aloes ætherea	
sacrum	rhei et aloes	
salutis	cassiæ sennæ composita	sennæ
stomachicum	gentianæ composita	gentianæ composita
vitrioli acidum	Acidum sulphuricum aromaticum	
Emplastrum adhæsivum	Emplastrum resinosum	Emplastrum resinæ
attrahens	simplex	ceræ
cantharidum	meloes vesicatorii	lyttæ

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Emplastrum cereum	Emplastrum simplex	Emplastrum ceræ
commune	oxidi plumbi semivitrei	plumbi
lithargyri	oxidi plumbi semivitrei ferri rubri	plumbi
roborans	meloes vesicatorii	cantharidis
vesicatorium		
Emulsio communis	Emulsio amygdalæ communis	Mistura amygdalæ
Extractum catharticum		Extractum colocynthidis compositum
Ferri rubigo squamæ	Carbonas ferri præparatus Ferri oxidum nigrum	
Ferrum ammoniatum	Murias ammoniæ et ferri	Ferrum ammoniatum
vitriolatum	Sulphas ferri	Ferri sulphas
ustum	Oxidum ferri rubrum	
Flores benzoini	Acidum benzoicum	Acidum benzoicum
martiales	Murias ammoniæ et ferri	Ferrum ammoniatum
sulphuris	Sulphur sublimatum	Sulphur sublimatum
zinci	Oxidum zinci	Zinci oxydum
Hepar sulphuris	Sulphuretum potassæ	Potassæ sulphuretum
Hiera picra		Pulvis aloes cum canella
Hydrargyrus acetatus	Acetis hydrargyri	
calcinatus		Hydrargyri oxydum rubrum
muriatus corrosivus	Murias hydrargyri	oxymurias
mitis	Sub-murias hydrargyri	sub-murias
præcipitatus	præcipitatus	
nitratus ruber	Oxidum hydrargyri per acidum nitricum	nitrico-oxydum

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Hydrargyrus præcipitatus cinereus	Oxidum hydrargyri cinereum	Hydrargyri oxydum cinereum
sulphuratus niger	Sulphuretum hydrargyri nigrum	
sulphuratus ruber		sulphuretum rubrum
vitriolatus flavus	Sub-sulphas hydrargyri flavus	
Infusum amarum	Infusum gentianæ compositum	Infusum gentianæ compositum
rosarum	rosæ gallicæ	rosæ
Julepum e camphora		Mistura camphoræ
Kali	Potassa	Potassa
Lac sulphuris	Emulsio amygdalæ	Sulphur præcipitatum
amygdalæ		Mistura amygdalæ
ammoniaci		ammoniaci
assafœtidæ		assafœtidæ
guaiaci		guaiaci
Laudanum liquidum	Tinctura opii	Tinctura opii
Linimentum anodynum	Tinctura saponis cum opio	
aquæ calcis	Oleum lini cum calce	
opiatum	Tinctura saponis cum opio	
saponaceum	saponis	Linimentum saponis compositum
volatile	Oleum ammoniatum	ammoniæ sub-carbonatis
Lithargyrus	Oxidum plumbi semivitreum	Plumbi oxydum semivitreum
Lixiva	Potassa	Potassa
Lixivium causticum	Aqua potassæ	Liquor potassæ
tartari -		sub-carbonatis

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Magnesia alba	Carbonas magnesiæ	Magnesiæ carbonas
usta	Magnesia	Magnesia
vitriolata	Sulphas magnesiæ	Magnesiæ sulphas
Mel Ægyptiacum		Linimentum æruginis
rosaceum		Mel rosæ
acetatum		Oxymel
Mercurius	Hydrargyrus	Hydrargyrus
calcinatus		Hydrargyri oxidum rubrum
corrosivus sublimatus	Murias hydrargyri	oxymurias
ruber }	Oxidum hydrargyri rubrum per acidum nitricum	nitrico-oxydum
præcipitatus ruber }	Sub-murias hydrargyri	sub-murias
dulcis sublimatus	Sub-sulphas hydrargyri	
emeticus flavus		Hydrargyrus præcipitatus
præcipitatus albus		
Minium	Oxidum plumbi rubrum	
Natron	Soda	Soda
Nitrum	Nitras potassæ	Potassæ nitras
Oleum teribinthinæ	Oleum volatile pini	Oleum teribinthinæ
Oxymel æruginis		Linimentum æruginis
Philonium Londinense		Confectio opii
Pilulæ cupri	Pilulæ ammoniareti cupri	
gummosæ		Pilulæ galbani composita
rufi	aloes cum myrrha	aloes cum myrrha

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Pilulæ thebaicæ	Pilulæ aloes opiatæ	Pilulæ saponis cum opio
Potio cretacea	Potio carbonatis calcis	Mistura cretæ
Pulvis antimonialis	Oxidum antimonii cum phosphate calcis	Pulvis antimonialis
Pulvis e bolo compositus cum opio	Pulvis carbonatis calcis compositus	Pulvis cretæ compositus cum opio
cretaceus	ipecacuanhæ et opii	cretæ compositus
doveri	asari compositus	ipecacuanhæ compositus
sternutatorius	sulphatis aluminæ compositus	
stypticus		
Resina alba	Carbonas ferri præparatus	Resina pini
Rubigo ferri præparata		
Saccharum saturni	Acetis plumbi	Plumbi super-acetas
Sal absinthii	Carbonas potassæ	Potassæ sub-carbonas
alkalinus fixus fossilis	sodæ	Sodæ sub-carbonas
alkalinus fixus vegetabilis	potassæ	Potassæ sub-carbonas
ammoniacus	Murias ammoniæ	Ammoniæ murias
volatilis	Carbonas ammoniæ	carbonas
catharticus amarus	Sulphas magnesiæ	Magnesiæ sulphas
glauberi	sodæ	Sodæ sulphas
cornu cervi	Carbonas ammoniæ	Ammoniæ carbonas
diureticus	Acetis potassæ	Potassæ acetas
glauberi	Sulphas sodæ	Sodæ sulphas
marinus	Murias sodæ	murias
martis	Sulphas ferri	Ferri sulphas

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Sal polycrestus	Sulphas potassæ cum sulphure	
rupellensis	Tartris potassæ et sodæ	Soda tartarizata
tartari	Carbonas potassæ	Potassæ sub-carbonas
Saturni extractum		Liquor plumbi acetatis
Soda purificata	sodæ	Sodæ sub-carbonas
muriata	Murias sodæ	murias
phosphorata	Phosphas sodæ	
tartarisata	Tartris potassæ et sodæ	Soda tartarizata
vitriolata	Sulphas sodæ	Sodæ sulphas
Spiritus ætheris vitriolici	Æther sulphuricus cum alcohole	Spiritus ætheris sulphurici
ammoniæ	Alcohol ammoniatum	ammoniæ
aromaticus	aromaticum	aromaticus
fœtidus	fœtidum	fœtidus
camphoratus	Tinctura camphoræ	camphoræ
cornu cervi	Aqua carbonatis ammoniæ	Liquor ammoniæ carbonatis
mindereri	acetitis ammoniæ	acetatis
nitri dulcis	Spiritus ætheris nitrosi	Spiritus ætheris nitrici
glauberi	Acidum nitrosum	
salis ammoniaci	Aqua ammoniæ	Liquor ammoniæ
marini glauberi	Acidum muriaticum	Acidum muriaticum
vinosus camphoratus	Tinctura camphoræ	Spiritus camphoræ
rectificatus	Alcohol	rectificatus
tenuior	dilutum	tenuior
vitrioli dulcis	Æther sulphuricus cum alcohole	ætheris sulphurici
volatilis aromaticus	Alcohol ammoniatum aromaticum	ammoniæ aromaticus
fœtidus	fœtidum	fœtidus

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Succi ad scorbuticos	Succus cochleariæ compositus	
Sulphur antimonii præcipitatum } auratum antimonii }	Sulphuretum antimonii præcipitatum	Antimonii sulphuretum præcipitatum
Sulphuris flores	Sulphur sublimatum	Sulphur sublimatum
Syrupus balsamicus	Syrupus toluiferæ balsami	Syrupus tolutanus
e meconio	papaveris somniferi	papaveris
Tartarus crudus	Super-tartris potassæ impurus	
Tartari crystalli	potassæ	Potassæ super-tartras
Tartarus emeticus	Tartris antimonii	Antimonium tartarizatum
Tartarum solubile	potassæ	Potassæ tartras
vitriolatum	Sulphas potassæ	sulphas
Tinctura aloes vitriolata	Tinctura aloes ætherea	
amara	gentianæ composita	Tinctura gentianæ composita
aromatica	cinnamomi composita	cinnamomi composita
cantharidum	meloes vesicatorii	lyttæ
ferri	muriatis ferri	ferri muriatis
fœtida	ferulæ assæfætidæ	assæfætidæ
guaiacina volatilis	guaiaci ammoniata	guaiaci ammoniata
japonica	mimosæ catechu	catechu
martis	muriatis ferri	ferri muriatis
melampodii	hellebori nigri	hellebori nigri
opii camphorata		camphoræ composita
rhei amari	rhei et gentiana	
rosarum	Infusum rosarum	Infusum rosæ
sacra	Vinum aloes socotorinæ	Vinum aloes

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Tinctura thebaica	Tinctura opii	Tinctura opii
tolutana	toluiferæ balsami	
valerianæ volatilis		valerianæ ammoniata
Trochisci arabici	Trochisci gummosi	
Turpethum minerale	Sub-sulphas hydrargyri flavus	
Tutia	Oxidum zinci impurum	
Unguentum album	Unguentum oxidi plumbi albi	
basilicum flavum	resinosum	Ceratum resinæ flavæ
cœruleum	hydrargyri	Unguentum hydrargyri
citrinum	nitratis hydrargyri	nitratis
epispasticum fortius	pulveris meloes vesicatorii	Ceratum lyttæ
mitius	infusi mel. vesicat.	
saturnimum	acetitis plumbi	Ceratum plumbi super-acetatis
Vinum amarum	Vinum gentianæ compositum	
antimoniale	tartritis antimonii	Liquor antimonii tartarizati
chalybeatum		Vinum ferri
Vitriolum album	Sulphas zinci	Zinci sulphas
cœruleum	cupri	Cupri sulphas
viride	ferri	Ferri sulphas
Vitrum antimonii	Oxidum antimonii cum sulphure vitrificatum	
Zincum ustum	Oxidum zinci	Zinci oxidum
vitriolatum	Sulphas zinci	sulphas

TABLE II.

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Acetis plumbi	Plumbi super-acetas	Saccharum saturni
potassæ	Potassæ acetas	Sal diureticus / Lixiva acetata
Acidum benzoicum	Acidum benzoicum	Flores benzoini
nitrosum dilutum	Acidum nitricum dilutum	Aqua fortis
sulphuricum	sulphuricum	Acidum vitriolicum
aromaticum		Acidum vitrioli aromaticum / Elixir vitrioli acidum
Æther sulphuricus	Æther sulphuricus	Æther vitriolicus
Alcohol	Alcohol	Spiritus vinosus rectificatus
Alcohol ammoniatum	Spiritus ammoniæ	Spiritus ammoniæ
aromaticum	aromaticus	aromaticus
fœtidum	fœtidus	fœtidus
Ammonia	Ammonia	Alkali volatile
Ammoniaretum cupri	Corpum ammoniatum	Cuprum ammoniacum
Aqua acetitis ammoniæ	Liquor ammoniæ acetatis	Spiritus mindereri
ammoniæ		Aqua ammoniæ causticæ
carbonatis ammoniæ	ammoniæ carbonatis	Spiritus cornu cervi / Aqua ammoniæ
potassæ	potassæ	lixivia caustica / Lixivium causticum
Carbonas ammoniæ	Ammoniæ carbonas	Sal ammoniacus volatilis cornu cervi

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Carbonas calcis	Creta preparata	Creta alba Lapilli cancrorum
ferri præparatus		Rubigo ferri præparata
magnesiæ	Magnesiæ carbonas	Magnesia alba
potassæ	Potassæ sub-carbonas	Sal alkalinus fixus vegetabilis tartari
sodæ	Sodæ sub-carbonas	Sal alkalinus fixus fossilis Soda purificata
zinci impurus	Calamina præparata	Lapis calaminaris
Decoctum guaiaci compositus		Decoctum lignorum
Electuarium aromaticum	Confectio aromatica	Confectio cardiaca
cassiæ sennæ	sennæ	Electuarium lenitivum
catechu		Confectio japonica
opiatum	opii	Electuarium thebaicum
Emplastrum meloes vesicatorii	Emplastrum lyttæ	Emplastrum vesicatorium
oxidi ferri rubri		roborans
plumbi semivitrei	plumbi	commune
resinosum	resinæ	adhæsivum
simplex	ceræ	cereum
Emulsio amygdalæ communis	Mistura amygdalæ	Emulsio communis
Murias ammoniæ	Ammoniæ murias	Sal ammoniacus
et ferri	Ferrum ammoniatum	Flores martiales
antimonii		Butyrum antimonii

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Murias hydrargyri sodæ	Hydrargyri oxymurias Sodæ murias	Hydrargyrus muriatus corrosivus Sal marinus
Nitras argenti potassæ	Argenti nitras Potassæ nitras	Causticum lunare Nitrum
Oleum ammoniatum	Linimentum ammoniæ	Linimentum volatile
lini cum calce		aquæ calcis
sulphuratum	Oleum sulphuratum	Balsamum sulphuris
Oxidum antimonii cum phosphate calcis	Pulvis antimonialis	Antimonium calcareo-phosphoratum
Oxidum antimonii cum sulphure per nitratem potassæ		Crocus antimonii, vel crocus metallorum
Oxidum antimonii cum sulphure vitrificatum		Vitrum antimonii
Oxidum ferri nigrum		Ferri squamæ
rubrum		Ferrum vitriolatum ustum
hydrargyri per acidum nitricum	Hydrargyri nitrico-oxydum	Hydrargyrus nitratus ruber
hydrargyri cinereum	oxidum cinereum	præcipitatus cinereus
plumbi album	Plumbi sub-carbonas	Cerussa
rubrum		Minium
semivitreum	oxydum semivitreum	Lithargyrus
zinci	Zinci oxydum	Flores zinci
impurum		Tutia

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Phosphas sodæ		Soda phosphorata
Pini abietis resina	Pix arida	Pix Burgundica
balsameæ resini	Terebinthina canadensis	Balsamum canadense
laricis oleum	Oleum terebinthinæ	Oleum terebinthinæ
Potassa	Potassa	{ Alkali fixum vegetabile { Causticum commune acerrimum
cum calce	Potassa cum calce	Causticum commune mitius
Potio carbonatis calcis	Mistura cretæ	Potio cretacea
Pulvis carbonatis calcis compositus	Pulvis cretæ compositus	Pulvis cretaceus
Soda	Soda	Alkali fixum fossile
Solutio sulphatis cupri composita		Aqua styptica
Spiritus ætheris nitrosi	Spiritus ætheris nitrici	Spiritus nitri dulcis
Sub-acetas cupri	Ærugo	Ærugo æris
Sub-murias hydrargyri	Hydrargyri sub-murias	{ Calomelas { Hydrargyrus muriatus mitis
Sub-sulphas hydrargyri flavus		Turpethum minerale
Succus spissatus momordicæ elaterii		Elaterium
Sulphas aluminæ	Alumen	Alumen
cupri	Cupri sulphas	Vitriolum cœruleum
ferri	Ferri sulphas	{ Sal martis { Vitriolum viride
magnesiæ	Magnesiæ sulphas	Sal catharticus amarus
potassæ	Potassæ sulphas	Tartarum vitriolatum
potassæ cum sulphure		Sal polychrestus
sodæ	Sodæ sulphas	glauberi

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Sulphas zinci	Zinci sulphas	Vitriolum album
Sulphur sublimatum	Sulphur sublimatum	Flores sulphuris
Sulphuretum antimonii	Antimonii sulphuretum	Antimonium
antimonii præcipitatum	sulphuretum præcipitatum	Sulphur antimonii præcipitatum
		auratum antimonii
hydrargyri nigrum		Æthiops mineralis
rubrum	Hydrargyri sulphuretum rubrum	Cinnabaris factitia
potassæ	Potassæ sulphuretum	Hepar sulphuris
Syrupus toluiferæ balsami	Syrupus tolutanus	Syrupus balsamicus
Super-tartris potassæ	Potassæ super-tartras	Tartari crystalli
Tartris antimonii	Antimonium tartarisatum	Tartarus emeticus
potassæ	Potassæ tartras	Tartarum solubile
potassæ et sodæ	Soda tartarizata	Sal rupellensis
Tinctura benzoes composita	Tinctura benzoini composita	Balsamum traumaticum
camphoræ	Spiritus camphoræ	Spiritus vinosus camphoratus
muriatis ferri	ferri muriatis	Tinctura martis
opii ammoniata	camphoræ composita	Elixir paregoricum
saponis	Linimentum saponis	Linimentum saponaceum
saponis cum opio		opiatum
		anodynum
Unguentum nitratis hydrargyri	Unguentum hydrargyri nitratis	Unguentum citrinum
acetitis plumbi	Ceratum plumbi super-acetatis	saturninum
pulveris meloes vesicatorii	lyttæ	epispasticum fortius
resinosum	resinæ	basilicum flavum

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