CHAP. VI.

OF ASTRINGENTS.

It has been supposed that the fibres of the living body, either over the whole, or in part of the system, may become relaxed, or lose that density and contraction which is necessary for the due performance of the several functions. And this is considered as an affection of the matter of which the fibre is composed, and not of the living or irritable principle connected with it. It has farther been imagined, that this relaxation may be removed by the application of those substances, which, when applied to dead animal matter, condense and constringe it; and such substances, classed as remedies, have received the appellation of Astringents. They are defined by Cullen: "Such substances as applied to the "human body produce contraction and condensation in "the soft solids, and thereby increase their density and "force of cohesion." And by the operation of this corrugating power, either directly exerted on a part, or extended by sympathetic action, the morbid affections arising from a state of relaxation are supposed to be removed.

The arguments adduced in support of these medicines exerting such a power, appear more conclusive than those brought in proof of any of the other explanations of the operations of medicines, founded on the mechanical physiology. Astringents, it is observed, exert, in a remarkable manner, this corrugating power on dead matter; they are serviceable as medicines in those affections which seem to depend on a relaxed state of the solids; they even corrugate the fibres of living matter, as is evident from the sensation they impress on the tongue and fauces; and applied to bleeding wounds, they restrain the hæmorrhage apparently by the same power.

We cannot, however, admit, without limitation, the suppositions on which this hypothesis is founded,—that the affections which astringents obviate depend on mechanical laxity of the solids, and that these substances act solely by removing that laxity, by inducing a mechanical or chemical change. Debility was indeed once ascribed to such a cause; but it is now admitted, that every degree of strength or weakness depends much more on correspondent variations in the state of the powers peculiar to living matter; and substances capable of obviating diseases dependent on any state of debility, must be such as are capable of acting on these powers. Many substances accordingly, arranged as Astringents, occasion very considerable alterations in some of the functions: they produce effects which cannot be referred to their condensing power, allowing them to possess it; and therefore, in all the changes they produce, part of

their operation at least must be referred to actions conformable to the laws of the living system.

For reasons of this kind, some have denied the existence of such a class of medicines as astringents. The substances which have usually received that appellation, they have considered as merely moderate stimulants, permanent in their action, and as differing little therefore from tonics.

It must be admitted, however, that there are substances which immediately restrain excessive evacuations; and that although between these and tonics there is in several respects a close resemblance, in others they differ widely. The most powerful astringents, oak bark for example, or galls, are much inferior in their tonic power to other substances having little or no astringency; while there are powerful tonics which do not produce the immediate effects of astringents.

There appears, therefore, to be a foundation for establishing such a class as astringents, though it is very difficult to point out the precise nature of their operation. It must be admitted, perhaps, that astringents possess a power of corrugating or condensing the animal fibre. The very sensation they excite in the mouth appears to be a sufficient proof of this, and it is farther established by chemical facts. That they likewise act as permanent stimulants, is proved by their power of removing intermittent fever and other states of the system connected with debility. The one power may be conceived perhaps to modify the other; and to this modification, or

to their combined action, the effects of astringents may be ascribed. The hypothesis of Darwin, that they act by producing absorption, accounts for some of their effects, but not for others, particularly their power of stopping hæmorrhage.

Astringents, from the powers they possess, are capable of being applied extensively to the treatment of diseases.

As stimulants, acting with considerable permanence, they may be substituted for tonics in diseases of debility. It has been found accordingly, that they have power to stop the paroxysm of an intermittent fever, when given a short time before its accession: and in cases of debility, they seem to be often of utility, independent of their power of checking debilitating evacuations.

It is however for restraining evacuations that astringents are most usually employed. Hæmorrhage, where it does not arise from a solution of continuity, depends on the contraction of the extreme arterial branches not being sufficient to resist the impulse of blood from the larger branches,—a deficiency of contraction generally owing to a debilitated state of these vessels. Astringents, as stimulants, slow and permanent in their action, and not sensibly increasing the force of the circulation, are calculated to obviate such a state; and this may be farther promoted by their corrugating power, extended by sympathetic action to the vascular fibre. Hence their use in menorrhagia, hæmoptysis, and other discharges of blood; though they likewise frequently fail, from their

operation being too slow and feeble, to resist the impetus of the circulation, or counteract the flow from a ruptured vessel. In epistaxis, or bleeding wounds, they are more powerful, as they can be more directly applied to the part.

By a similar operation, they in some measure check serous effusions; hence their use to restrain colliquative sweats. In diarrhœa too, they appear to operate by checking the effusion of fluid from the exhalant vessels, and thus diminishing the increased stimulant operation, which from this cause is exerted on the intestines, and increases their peristaltic motion. In the latter stage of dysentery, where an increased evacuation appears to be connected with debility of the exhalant vessels, their cautious administration is advantageous. And in passive inflammation, attended with increased serous discharge, as in gleet, and in some forms of ophthalmia, the topical application of astringents affords the most successful mode of treatment.

In the administration of astringents, it is an obvious caution, that they ought not to be applied to check evacuations where these are critical, or where they are necessary to relieve a plethoric state of the vessels, or a state of increased action; at least unless the evacuation proceed to an alarming extent.

Some narcotics, as opium, have sometimes effects apparently astringent. When increased discharges take place from irritation, these remedies, by diminishing irritability, lessen the discharge; they are thus serviceable

both in hæmorrhage and in diarrhœa arising from that cause. But their mode of operation is obviously different from that of astringents, and in the cases in which they are useful, astringents would be less useful, and only by an indirect operation.

Astringents may be subdivided into those belonging to the mineral, and those belonging to the vegetable kingdoms, which differ considerably from each other in their chemical properties, and probably therefore in the mode in which they produce their astringent effect.

ASTRINGENTS.

From the Mineral Kingdom.

Acidum sulphuricum.
Argilla.
Super-sulphas argillæ et potassæ.
Calx.
Ferrum.
Zincum.
Cuprum.
Plumbum.

From the Vegetable Kingdom.

Quercus robur.
Quercus cerris.
Tormentilla erecta.
Polygonum bistorta.
Anchusa tinctoria.
Hæmatoxylon campechianum.
Rosa gallica.
Arbutus uva ursi.
Mimosa catechu.
Kino.
Pterocarpus draco.
Pistacia lentiscus.

Of Astringents from the Mineral Kingdom.

Acidum sulphuricum. Sulphuric Acid. Acidum Vitriolicum. Vitriolic Acid.

Sulphur combines with oxygen in different proportions; when united with the largest proportion, it forms an acid extremely powerful from its state of concentration, the Sulphuric Acid. This acid used to be obtained from the decomposition of sulphate of iron, the Green Vitriol of commerce, by heat, and hence the name of Vitriolic Acid which was given to it. It is now formed by the combustion of sulphur. The sulphur, reduced to powder, is mixed with from one-eighth to one-tenth of its weight of nitrate of potash, by which its combustion, when begun, can be continued without the free access of atmospheric air, the nitric acid of the nitrate affording the requisite quantity of oxygen. It is thus burnt in a large leaden chamber; the sulphuric acid, which is slowly formed, is absorbed by water placed in the bottom of the chamber, and the acid liquor is brought to the due degree of concentration, by exposing it to heat in glass retorts. It is of a thick consistence, and has an apparent unctuosity; its specific gravity is 1.850; it is colourless and transparent; is highly corrosive, and possesses all the general acid properties in an eminent degree. As obtained by this process, it is not perfectly

pure, but contains a little sulphate of potash, and sometimes a little sulphate of lead. The quantities of these, however, especially of the latter, are very inconsiderable; they are in a great measure separated when the acid is diluted, and hence this dilution not only renders it more convenient for administration, but likewise more pure.

As a medicine, this acid is employed as a refrigerant, but principally as an astringent, and in this property it is undoubtedly superior to any other acid. It is used as an astringent to check the flow of blood in hæmoptysis, and the colliquative sweat in hectic fever, indications which it fulfils better than any other article in the Materia Medica. It is sometimes also used in menorrhagia and diabetes; and as a tonic, founded on its astringent property, in dyspepsia. In its concentrated state, its dose can scarcely be measured. In the Pharmacopœias, it is therefore ordered to be diluted. According to the formula given by the Dublin and Edinburgh Colleges, the Acidum Sulphuricum Dilutum consists of one part of the strong acid with seven of water; it is given in a dose from 10 to 30 drops. The London College, without any sufficient reason for the deviation, have ordered, under the same name, an acid diluted with not much more than five parts of water. The Acidum Sulphuricum Aromaticum consists of the acid diluted with alkohol impregnated with aromatics, and is given in a similar dose. From its astringency, this acid is frequently added to gargles, which are employed to check salivation, or relieve relaxation of the uvula. Externally

mixed with lard, in the proportion of half a drachm to an ounce, it has been used with advantage in psora, and it has also been given internally in the same disease.

Offic. Prep.—Acid. Sulph. Dil. *Ph. Ed. Lond. Dub.* —Acid. Sulph. Aromat. *Ed.*

ARGILLA. Argil.

THIS earth, in its pure form, is insipid and inert; but in its saline combinations, at least all of them which, from their solubility, are sufficiently active, there exists a greater or less degree of astringent power. The Boles, of which the Armenian Bole (Bolus Armena) is the chief, are argillaceous earth, impregnated with oxide of iron; they were at one time employed as astringents, but are entirely inert, and are now expunged from practice.

SUPER-SULPHAS ARGILLÆ ET POTASSÆ. Alumen. Alum.

THIS is a salt composed chiefly of argillaceous earth and sulphuric acid, the acid being in excess. It likewise always contains, however, a smaller portion of potash, and in some of the forms of it met with in commerce, sometimes also ammonia. It is found native, effloresing generally in the interstices of what is named alum slate; or it is prepared by exposing alum ores, which are native compounds of argillaceous earth and sulphur, to atmospheric air; the sulphur absorbing oxygen, forms sulphuric acid, which unites with the argillaceous earth, with a portion of potash which the ore contains; or if this alkali is not present in sufficient quantity, either it

or impure ammonia is added to the liquor obtained by lixiviation, so as to dispose it to crystallize. This liquor is then concentrated by boiling, so as to obtain, on cooling, the alum in a solid state, of a crystalline structure, though of no regular form.

This salt is in large transparent masses; it has a styptic taste, with a degree of sweetness. From the excess of its acid it reddens the vegetable colours. It is soluble in eighteen parts of cold, and in less than two of boiling water. The variety termed Roche or Rock Alum (Alumen Rupeum) has a reddish colour from the presence of a portion of oxide of iron. Common alum consists of 26 of acid, 12.5 of argil, 10 of potash, and 51.5 of water.

Alum, from its astringent power, is employed to check hæmorrhagies and serous evacuations: it is thus given in menorrhagia, leucorrhœa, and diabetes; and in leucorrhœa, is perhaps more successful than any other astringent. It has likewise been used, though less frequently, in intermittent fever, and in colica pictonum. Its dose is from 5 to 10 grains. The addition of an aromatic is generally necessary, to prevent it from exciting nausea, when it is given in the solid form; but the best form of administering it, is that of Alum Whey (Serum Aluminosum), prepared by adding two drachms of pounded alum to a pint of hot milk; the dose of this is 3 or 4 ounces. Externally alum is frequently used as the basis of astringent gargles, and of injections used in gleet; and dissolved with sulphate of zinc or copper, it forms

very styptic solutions, employed to check hæmorrhage by direct application.

Offic. Prep.—Sulph. Alum. Exs. Pulv. Sulph. Alum. C. *Ed.*—Liq. Alum. C. *Lond.*

CALX. Lime. Calx Viva. Quicklime.

LIME is a primary earth, found abundantly in nature, in several states of combination. It is obtained by exposing any of the native compounds of it with carbonic acid, usually chalk, limestone, or marble, to a heat gradually raised, so that the acid is expelled, and the lime remains pure. It is soluble in water, in sparing quantity; about 700 parts being required for its solution. Yet even in this weak state of impregnation, the solution which is known by the name of Lime Water (Aqua Calcis) has a strong styptic taste, and is capable of exerting important chemical agencies, as well as of acting on the living system. As an astringent lime water is employed in diabetes, and in diarrhœa: the dose is one or two pounds in the course of the day. It is used likewise in dyspepsia, in which it proves useful, more by its tonic and astringent power, than by its effect in neutralizing acid in the stomach. Externally it is applied as a wash in ill-conditioned ulcers.

Offic. Prep.—Aq. Calc. Ol. Lini cum Calce. *Ed.*

CARBONAS CALCIS. Carbonate of Lime.

THE various kinds of carbonate of lime, Chalk (Creta Alba), Crabs Claws (Chelæ Cancrorum), Oyster Shells

(Testæ Ostreorum), are not unfrequently used in diarrhœa, but they evidently prove useful, not by any real astringent power, but by correcting the acidity which so frequently occasions or aggravates that disease. They rather belong, therefore, to the class of Antacids.

FERRUM. Iron. (Page 223.)

THIS metal has been already considered as a tonic; it is likewise employed as an astringent to check increased evacuations. It is thus used with advantage in some forms of passive hæmorrhage, particularly menorrhagia. The advantages derived from it in such cases, may be supposed to depend on its tonic power; the styptic taste, however, of its saline preparations, is a sufficient proof of the presence of astringency to a certain extent; and it is not improbable that this may coincide with, or modify the operation connected with its action as a tonic. The sulphate of iron is the preparation in which this astringent property is most obvious.

ZINCUM. Zinc. (Page 227.)

THIS metal has likewise been considered as a tonic. Its saline preparations have, however, a considerable degree of astringency, and there are several medicinal applications of them founded on this quality.

Sulphate of Zinc (Sulphas Zinci) has been employed internally as an astringent in chronic dysentery, and in the treatment of intermittent fever; but from its emetic power its operation is liable to be harsh, and is not

easily regulated. Its solution is in common use as an injection in gonorrhœa, when the inflammatory state has subsided, and in gleet; two grains being dissolved in an ounce of water, and it frequently succeeds in checking the discharge, apparently from its astringent power. A solution of nearly the same strength is likewise used as a collyrium in ophthalmia; the astringent power of this being increased, according to a formula in the Edinburgh Pharmacopœia, by the addition of a few drops of diluted sulphuric acid. Dissolved with alum, it forms a very styptic liquor, which has long been in use for stopping hæmorrhage, and checking increased discharges by external application.

Offic. Prep.—Sol. Sulph. Zinc. *Ph. Ed.*—Liq. Alum. Comp. *Ph. Lond.*

Acetate of Zinc, under the form of solution (Solutio Acetitis Zinci), is obtained by adding a solution of acetate of lead to a solution of sulphate of zinc, a decomposition immediately taking place, and sulphate of lead being precipitated, while acetate of zinc remains dissolved. This has long been in use as a mild astringent injection in gonorrhœa, less liable to produce irritation, or to check the discharge suddenly than the solution of sulphate of zinc, and rather more active than the solution of acetate of lead. It has therefore received a place in the Edinburgh Pharmacopœia. A solution of the salt in alkohol has been introduced into the Dublin Pharmacopœia, and when used is largely diluted with water.

CUPRUM. Copper. (Page 229.)

THIS metal has so far an analogy to the preceding ones, that, along with the general action which it exerts on the system, capable of obviating spasmodic affections, it has a degree of astringent power. This too is conspicuous, principally in its combination with sulphuric acid, the sulphate of copper. This in solution is sometimes used externally as an astringent; and dissolved with alum in water, to which a portion of sulphuric acid is added, it forms a very styptic solution, formerly named Aqua Styptica, sometimes employed by direct application to restrain hæmorrhage. The formula has a place in the Edinburgh Pharmacopœia.

Offic. Prep.—Sol. Sulph. Cupr. Comp. *Ph. Ed.*

PLUMBUM. Lead.

THIS metal, when rendered capable of acting on the system by oxidation, or combination with acids, produces very deleterious effects, and proves a powerful, though insidious poison. Nor is it easy to explain its mode of action. It appears to act peculiarly on the muscular fibre, repressing action, and at length exhausting the irritability of the muscles. When introduced slowly into the system, the intestines are first affected, constipation from diminished action takes place, accompanied frequently with severe pain. Tremor and debility of the voluntary muscles succeed, and are followed by complete paralysis, the muscles losing their firmness and cohesion. When a large quantity of any of the active preparations of lead is

received into the stomach, these symptoms occur suddenly and with violence, giving rise to what is named Colica Pictonum, and the same disease is sometimes suddenly induced by the progressive accumulation of the metal in smaller quantities. A sense of constriction is felt in the stomach and bowels, with obstinate constipation and the most severe pain; the pulse is small and hard; respiration becomes laborious; there is general muscular debility and tremor, accompanied with cold sweats and convulsions, which have often a fatal termination.

From this power of repressing muscular action, lead produces effects analogous in some respects to those of astringents, and it is regarded as an astringent, though its mode of operation is probably dissimilar. The preparations of it which have been applied to medicinal use, are the semi-vitrified oxide, white oxide or sub-carbonate, and the acetate and super-acetate.

Lithargyrum. Litharge. The substance thus named is the semi-vitrified oxide (Oxidum Plumbi Semi-Vitreum). It is usually obtained in the calcination of lead, with the view of separating the silver, which is frequently associated with it; the flame, with a current of air, being made to reverberate on the surface of the melted metal. It is in flakes of a yellow colour, with somewhat of a vitreous lustre. A small quantity of carbonic acid, not exceeding 4 parts in 100, exists in it, apparently, however, not essential to its constitution. It is used only in some phar-

maceutical preparations, particularly for forming, when boiled with oil, a plaster which serves as the basis of other compound plasters, and which is itself sometimes applied as a healing dressing to wounds, proving useful by excluding the air.

Offic. Prep.—Emp. Oxid. Plumb. *Ph. Ed. Lond. Dub.*

Minium. Red Lead.—This is an oxide containing about 12 of oxygen in 100 parts. It is sometimes applied to the same purposes as litharge, and an ointment formerly in use as a cooling application was prepared by rubbing it with vinegar and oil. It might be discarded, however, from the Pharmacopœia.

Cerussa. Cerusse, or White Lead.—This is prepared by exposing plates of lead to the vapour arising from vinegar; a white crust is formed on their surfaces, which, when it has accumulated sufficiently, is scraped off, and reduced to a fine powder by levigation. The nature of this substance has not been very well ascertained. It has been regarded merely as an oxide; hence the name Oxidum Plumbi Album, given to it by the Edinburgh College. A little carbonic acid being generally contained in it, either absorbed from the atmosphere, or formed from the partial decomposition of the acetic acid, it has been considered as a sub-carbonate; and the London College have defined it as such, while, for a reason not easily imagined, they have named it Carbonas Plumbi. From theory, it might be inferred to contain a portion of the acetic acid by which it is formed; the Dublin College have accordingly named it Sub-Acetas Plumbi, and it is

not improbable that this is most correct. It is used only externally, being applied in fine powder to slight cases of excoriation or inflammation, and used particularly to relieve these affections in children,—a practice, however, which, from some observations, appears not to be altogether without danger, and which is unnecessary, as the levigated calamine stone answers equally well. It is used likewise as the basis of an ointment, which is sometimes applied as a cooling dressing to inflamed parts.

Offic. Prep.—Ungt. Oxid. Plumb. Alb. *Ph. Ed.*

Acetas Plumbi. Acetate of Lead.—There are two compounds of lead with acetic acid, medicinally employed. One is the salt which has been long known by the name of Sugar of Lead, (Saccharum Saturni); the other a solution, which was named Goulard's Extract of Lead; and it is only lately that the relation between these has been established.

The first had been regarded as the proper acetate of lead. Thenard found, that it is the super-acetate, or contains an excess of acid, which is necessary to give it its usual crystalline form, which is that of a slender four or six sided prism. When its solution is boiled with a little oxide of lead, the neutral acetate is formed, which crystallizes in plates. Goulard's Extract, which is prepared by boiling vinegar on litharge, Dr Bostock found to be a solution of the neutral acetate. And the terms of Acetate and Super-acetate are now employed by the London College to distinguish these preparations.

Super-Acetas Plumbi. Super-Acetate of Lead.—

This is still named Acetate of Lead (Acetas Plumbi) in the Edinburgh Pharmacopœia, the nature of it having only lately been ascertained. It is the sugar of lead of the old nomenclature. The process for preparing it consists in boiling vinegar on cerusse, until the acid acquire a sweet taste, and evaporating the liquid, so that on cooling it affords crystals: it is usually prepared on a large scale. It is in masses composed of slender prismatic crystals, aggregated, of a yellowish colour, slightly efflorescent: it has a very sweet and styptic taste, is abundantly soluble in water, but scarcely forms a transparent solution even with distilled water, owing to a slight decomposition, in consequence of which a little sub-acetate is precipitated. It consists, according to Thenard's analysis, of 58 of oxide, 26 of acid, and 16 of water.

The medicinal use of this salt is nearly limited to its external application. Yet some practitioners have recommended it in different cases of profuse evacuation, particularly in hæmorrhage, where other remedies have failed: it has thus been given in menorrhagia, in the dose of half a grain repeated every four hours: it has likewise been employed in obstinate leucorrhœa, and to restrain the colliquative sweat accompanying hectic fever. From the deleterious agency, however, of lead on the system, it is a remedy which must be used with reluctance, and which is accordingly scarcely ever ventured on in modern practice. There is one circumstance too, that renders its administration more difficult,—its being liable to be considerably influenced by idiosyncrasy; many facts having

sufficiently established, that its action is extremely unequal, quantities of it having been often taken without any injurious effect, which, in other cases, would have proved in the highest degree deleterious.

As an external application, it is often employed to obtain its astringent effect. A solution of it, of the strength of three grains to an ounce of water, is used as an injection in gonorrhœa; and producing no irritation, is not liable to be attended with the injurious consequences which sometimes arise from preparations more active. A solution rather weaker is employed as a collyrium in ophthalmia, and can be applied with safety, even in the state of active inflammation. A solution somewhat stronger is a common application in superficial inflammation; and an ointment, of which it is the basis, is often employed as a dressing to inflamed or excoriated parts. Its saturated solution, combined with vinegar, is also frequently employed as a discutient. Facts have been brought forward, which apparently prove, that the general effects of lead on the system have been produced by the incautious or too long continued use of these external applications; while, in many cases, they have unquestionably been extensively employed without the production of any bad effect, and indeed are so in common practice; the opposite facts, therefore, if the observations with regard to them have been correct, are probably to be accounted for from the peculiar idiosyncracy, which, as has been remarked, exists with regard to the action of lead

on the system, in consequence of which some individuals are more liable to be affected by it than others.

The neutral acetate of lead, it has been stated above, forms the basis of what has been named Goulard's Extract,—a preparation which has long been in use among surgeons. It is the Aqua Lithargyri Acetati of the former edition of the London College, now named Liquor Plumbi Acetatis; and prepared by boiling vinegar on litharge. Although it differs in chemical composition from the preceding preparation, it does not appear to differ from it in medicinal powers. It is used diluted with water, as a lotion in cutaneous diseases, or as an application to inflamed surfaces. In the original formula for the preparation of this lotion given by Goulard, a little ardent spirit was added to it, and this being in common use has been received as an officinal preparation by the London and Dublin Colleges.

Offic. Prep.—Ungt. Acet. Plumb. *Ph. Ed. Lond. Dub.* —Liq. Plumb. Acet. Dilut. *Ph. Lond. Dub.*—Cerat. Plumb. Composit. *Ph. Lond.*

Of Vegetable Astringents.

The property of astringency in vegetables, denoted by its effect of corrugating the animal fibre, appears to be dependent on a common chemical principle, or at least to be connected with some peculiarity of composition; since

vegetable astringents uniformly possess certain common chemical properties. Thus, their astringency is extracted both by water and by alkohol; these infusions strike a purple or black colour with any of the salts of iron, deeper in general as the astringent is more powerful; and they are capable of corrugating, more or less strongly, dead animal matter, as is shewn in their operation in the process of tanning.

In the farther investigation of this subject, it was found, that a peculiar acid exists in the more powerful astringents; the acid which, from being contained abundantly in galls, has been named Gallic, and the general chemical characters of which, in the preliminary sketch on the principles of Pharmaceutic Chemistry, have been enumerated. This acid having the property of striking a deep purple colour with the salts of iron, the chemical change which had been more particularly considered as the test of astringency, was supposed to be the astringent principle.

To this, however, there existed a very obvious objection, that the acid, when obtained insulated, was possessed of no great astringency, and scarcely indeed of that property in any sensible degree; and farther, that the colour it did strike with the salts of iron was less deep than that from the infusions of the more powerful astringents.

The researches of Seguin, some years ago, threw more light on this subject by the discovery of a different principle existing in astringents, and having a better claim to

be ranked as the principle of astringency. Applying the proper test to discover it, that of the animal matter, on which it peculiarly operates, he found, that on adding a solution of animal gelatin to the infusion of a vegetable astringent, as that of galls or oak bark, a copious precipitation takes place, consisting of this principle in combination with the gelatin. Being the agent which gives to astringents their property of tanning, it has received the name of Tannin, and its properties, as a proximate principle of vegetables, have been already stated.

That it is the principle of astringency in vegetables, admits now of little doubt. Gallic acid has no such power, while tannin has a harsh styptic taste, and the power of corrugating the animal fibre. Seguin had supposed, that in the operation of tanning, its action is facilitated by that of the gallic acid, the acid partially deoxidizing the skin, and thus bringing it nearer to the state of gelatin with which the tannin combined. A similar action might be supposed to be exerted on the animal fibre in the production of the astringent effect. The theory of Seguin, however, was established by no proof, and the fact alone that some of the most powerful astringents, as catechu or kino, contain no gallic acid, but tannin mixed only with mucilage or extract, is a proof that it is to the action of this principle that the whole effect is to be ascribed.

If astringency, as exerted by vegetables, is thus to be considered as the result of the chemical action of the principle on which it depends, there is considerable diffi-

culty, as has been already remarked, in conceiving how it can be exerted in the animal system, especially in a distant part, when the astringent acts only on the stomach. It can only be conceived, that corrugation, or some similar change, is produced by it in the fibres of the stomach, which may be propagated by sympathy to distant parts, nearly in the same way as the impression of cold is communicated.

QUERCUS ROBUR. Oak. *Monoec. Polyand. Amentaceæ. Cortex. Indigenous.*

THE bark of this tree possesses a large share of astringency, which it yields to water. The infusion contains both gallic acid and the tanning principle, the latter in a considerable quantity, attached to the ligneous fibre which forms the basis of the bark; an ounce of bark afforded, in Mr Davy's experiments on the principal astringents, 111 grains of solid matter by lixiviation, of which 77 were tannin.

Oak bark has been used as a remedy in hæmorrhage, diarrhœa, and intermittent fever, given in a dose from 15 to 30 grains. In modern practice, its strong infusion or decoction is occasionally employed as an astringent gargle in cynanche, as an injection in leucorrhœa and profuse menorrhagia, and as a fomentation in hæmorrhoids and prolapsus ani.

Offic. Prep.—Extr. Cort. Querc. *Dub.*

QUERCUS CERRIS. *Monoec. Polyand. Amentaceæ. Cynips nidus. Galla. Galls. South of Europe.*

THE tubercles, named Galls, are found on the branches of this tree. Their production is occasioned by the bark being pierced by an insect of the cynips genus, to deposite its egg. The juice exuding slowly, is inspissated, and hardens. The best galls are heavy, knotted on the surface, and of a blue colour, They are nearly entirely soluble in water, at least with the assistance of heat; the infusion reddens the vegetable colours from the action of the gallic acid, and this acid can be procured in considerable quantity, by allowing the infusion to remain exposed to the air until its other principles are decomposed, or by sublimation from the galls. The infusion too contains a large quantity of tannin, as it gives a very copious precipitate with solution of gelatin. It has farther been supposed to hold dissolved extract and mucilage; but the existence of extract is doubtful, and from Dr Bostock's experiments there appears to be no sensible portion of mucilage. The proportion of tannin varies considerably in different specimens of galls. In Mr Davy's analysis of Aleppo galls, 500 grains afforded to water by lixiviation 185 grains of solid matter, of which 130 were tannin, 31 gallic acid, 12 saline and earthy matter, and 12 supposed to be mucilaginous and extractive matter.

In medical practice, galls, though so powerfully astringent, are not much employed, and are seldom internally administered. The strong infusion or decoction has been applied to the same purposes as the decoction of oak bark.

And an ointment composed of the galls in fine powder with eight parts of simple ointment is used as an astringent application to hæmorrhoidal affections.

Offic. Prep.—Tinct. Gallar. *Ph. Dub.*

Tormentilla erecta. Tormentil. *Icosand. Polygyn. Senticosæ. Radix. Indigenous.*

The root of tormentil is strongly astringent, with little flavour or bitterness, and though not chemically examined probably owes its astringency to tannin. It has been used in diarrhœa, under the form of decoction, and in intermittent fever, in substance, in the dose of from half a drachm to a drachm. But it is now nearly discarded from practice.

Polygonum bistorta. Bistort. *Octand. Trigyn. Oleraceæ. Radix. Indigenous.*

The root of this plant is a pure and very strong astringent; as such it has been used in diarrhœa and in intermittent fever, in a dose from a scruple to a drachm. But having probably no superiority over other astringents, and no peculiar virtue, it has fallen into disuse.

Anchusa tinctoria. *Alkanet. Pentand. Monogyn. Asperifoliæ. Radix. South of Europe.*

The cortical part of the root of this plant has a deep red colour, which has the singular property of not being extracted either by water or alkohol, but readily by expressed oils. It possesses a slight degree of astringency;

but it is now only employed to communicate colour to ointments.

HÆMATOXYLON CAMPECHIANUM. Lignum Campechense. Logwood. *Decand. Monog. Lomentaceæ. Lignum. South America.*

THE wood of this tree is of a very deep red colour; it has scarcely any smell; its taste is sweetish and astringent. Its active matter is extracted by water, and by alkohol, leaving the ligneous fibre which is its base undissolved; both solutions strike a deep purple colour with the salts of iron, and give a precipitate with gelatin. Logwood has been employed in medicine as an astringent, in diarrhœa and chronic dysentery, under the form of the decoction, or the watery extract. The extract has been proposed to be used as a substitute for kino.

Offic. Prep. — Extr. Hæmatoxyl. Camp. *Ph. Ed. Dub. Lond.*

ROSA GALLICA. Rosa Rubra. Red Rose. *Icosand. Polyg. Senticosæ. Petala. South of Europe.*

THE petals of this species of rose have a slight degree of astringency, which is most considerable before they are expanded, and it is in this state that they are collected and dried for use. The fresh leaves of the flowers are made into a conserve with sugar, which was at one time regarded as a remedy of some power in hæmoptysis and phthisis, but which has long been acknowledged to be perfectly inert. The infusion of the dried leaves,

slightly acidulated by the addition of sulphuric acid, forms a pleasant astringent gargle.

Offic. Prep.—Inf. Ros. Gall. Cons. Ros. R. Syr. Rosæ. *Ph. Ed.*—Mel. Rosæ. *Lond. Dub.*

ARBUTUS UVA URSI. Bears Whortle-Berry. *Decand. Monog. Bicornes. Folia. Europe, America.*

THE leaves of this plant have a bitter astringent taste, without any odour. Their watery infusion strikes a deep black colour with the salts of iron, and from their known astringency, which adapts them even to the purpose of tanning, probably contains a large proportion of tannin.

From its astringency, uva ursi has been employed in menorrhagia and other fluxes. It has however been used more particularly in cystirrhœa, calculus, and ulcerations of the urinary organs. In checking the increased secretion of mucus from the bladder, which constitutes the first of these diseases, it appears to be superior to other astringents; to calculus, in common with other bitters and astringents, it affords relief, probably by its action on the stomach preventing the generation of acid. More lately it has been recommended in phthisis. Its dose is half a drachm of the leaves in powder, twice or thrice a-day.

MIMOSA CATECHU. *Polygam. Monoec. Lomentaceæ. India. Ligni Extractum. Catechu. Terra. Japonica.*

To this substance, formerly known by the absurd name

of Japan earth, the appellation of Catechu is now appropriated. It is an extract prepared by boiling the interior wood of the tree with water, and the tenacious residual mass is dried by exposure to the air and sun. It is of a yellow or brown colour, has a bitter and astringent taste, leaving an impression of sweetishness; but its qualities vary considerably. Two kinds are at present met with in the shops; one is of a light yellowish brown colour, is smooth and uniform in texture, breaks short, is soft and light; the other is of a dark brown colour, more heterogeneous, heavier, and considerably harder.

Catechu is almost entirely soluble in water with the assistance of heat, the residuum consisting of accidental impurities. It is nearly equally soluble in alkohol. Its solution strikes a deep black colour with the salts of iron, and gives an abundant precipitate with animal gelatin. From Mr Davy's experiments, it appears to be composed of tannin, extractive matter and mucilage; the proportions in the best catechu being 54.5 of the first, 34 of the second, 6.5 of the third, and 5 residual matter. Our knowledge with regard to the principle named Extract is so imperfect, that it is difficult to establish any certain conclusion with regard to it; and the subsequent experiments of Dr Bostock, as to the modes of separating what is called Extract from the Tannin of catechu, do not exactly accord with those of Mr Davy. Dr Bostock has remarked, too, that catechu gives indications of the presence of gallic acid, and that its watery infusion even reddens the more delicate vegetable colours.

Catechu is in common use as an astringent, and in the uniformity and certainty of its operation is probably equal, or even superior to any of the vegetable astringents. It is used in diarrhœa generally under the form of the infusion, or the tincture: or the officinal preparation, the electuary of catechu, consisting of catechu and kino with some aromatics and a little opium is diffused in water, forming what has been named the Japonic Mixture. In substance it may be given in a dose from 10 to 20 grains, which may be frequently repeated. Under the form of troches, it is sometimes used in relaxation of the uvula, or sponginess of the gums, being allowed to dissolve slowly in the mouth.

Offic. Prep.—Elect. Catechu. Inf. Catech. Tinct. Catech.—*Ph. Ed. Lond. Dub.*

Kino.

The substance distinguished by this name was introduced a number of years ago into the Materia Medica as a powerful astringent, little being known with regard to its origin, farther than it was said to be the produce of Africa, and obtained probably from the plant affording it by exudation. Subsequent to its introduction, it was met with in the shops very various in its qualities: it still is so, and is obviously of different origin, though there is considerable obscurity with regard to the natural history of these varieties. The London College have described it merely as the produce of an African plant unknown. The Edinburgh College have inserted it in their catalogue

of simples, as the concrete juice of the Eucalyptus Resinifera,—a tree a native of New Holland; and there is reason to believe that at least part of what is called Kino in the shops is imported from that country, and is the produce of this vegetable. The Dublin College have considered kino as the product of the Butea Frondosa, on the authority of Roxburgh; but incorrectly, as Dr Duncan has remarked. He has farther observed, what is perfectly just, that much of the kino of the shops bears all the appearance of an extract artificially prepared, and is known to be formed from different astringent vegetables.

It is not very easy to discriminate exactly among these various substances, and to assign to each its real origin. One variety, and which bears the highest price in the shops, has all the appearance of a natural production: slender twigs are intermixed in its substance; it is of a reddish brown colour, with a resinous lustre, is very brittle, and has a bitterish astringent taste. This corresponds in its characters with the substance first introduced as kino, and is still said to be the produce of Africa, and to be imported from Senegal. The kind from New Holland has also the appearance of a natural production, fragments of bark being intermixed with it; it is in more solid masses than the other, is less brittle, and with its astringency has a disagreeable mawkish sweetish taste. The third kind, and which is most commonly met with, has the appearance of an extract thoroughly dried; it is in small fragments, with a resinous fracture, is of a brown colour, more approaching to black than the others, and has a

taste astringent and slightly bitter. This Dr Duncan has stated is said to be the produce of the Coccoloba Uvifera. I have also been informed, that it is the Extract of the wood of the mahogany.

The analysis of kino has been executed; but from the difficulty of ascertaining exactly to what substance the name is applied, there is a difficulty in appropriating the results to any of the varieties that are met with. All of them, however, appear to contain a large proportion of tannin; their solutions giving a deep colour, not purple however, but green, with salts of iron, and a copious precipitate with gelatin. The active matter of all or the greater number of them is soluble in water with the assistance of heat, and is still more easily soluble in alkohol.

Kino has been employed as an astringent for the same purposes as catechu, and they are often given in combination. The catechu being more uniform in its qualities, ought perhaps to be preferred.

Offic. Prep.—Tinct. Kino, *Ph. Ed. Lond. Dub.*—Pulv. Kino. Comp. *Lond.*

PTEROCARPUS DRACO. Sanguis Draconis. *Dragon's Blood. Diadelph. Decand. Papilionaceæ. Resina. South America.*

THE substance to which the absurd name of Dragon's Blood has been given, is a resinous concrete of a dark red colour, and heterogeneous texture, varying also frequently in its qualities as it is met with in the shops. It

is insipid; and though it has been considered as an astringent, has probably no such power, nor is it now applied to any medical use.

PISTACIA LENTISCUS. Mastiche. Mastich. *Dioecia. Pentand. Amentaceæ. Resina. South of Europe.*

THE resin named Mastiche is the produce of this shrub by exudation. It is in small rounded fragments of a light yellowish colour, nearly transparent, brittle, and hard, but when pressed or chewed becoming somewhat tenacious. It is chiefly resinous, and is hence dissolved by alkohol, a substance however remaining undissolved, tenacious and elastic, approaching in its characters to caoutchouc. Mastiche is insipid, and nearly inodorous, giving only a slightly fragrant smell when heated. Though it has been regarded as an astringent, and as such was at one time employed in medical practice, it has no sensible activity, and might be discarded from the lists of the Materia Medica. It is used from its insolubility and tenacity to fill the cavity in carious teeth.