CHAP. XI.

OF DIAPHORETICS.

DIAPHORETICS are those medicines which increase the natural exhalation by the skin. When they excite this so copiously as to produce sweat, they are named Sudorifics. The operation of both is the same, differing only in degree; diaphoretics in doses sufficiently large acting as sudorifics, and sudorifics in diminished doses, or under peculiar circumstances, occasioning only a slight diaphoresis. The fluid effused too is in both cases alike, being chiefly the watery part of the blood, with a slight impregnation of saline matter. In the one case it is discharged more slowly, and therefore passes off in the state of vapour; in the other it is discharged copiously from the exhalant vessels in the liquid form.

The operation of these medicines is not obscure; the natural exhalation is merely increased; the action of the exhalant vessels on the surface must therefore have been augmented, and the substances belonging to this class must be those which stimulate these vessels.

Of stimuli of this kind, external heat affords an example; it is directly applied to the vessels, and must occa-

sion in them an increased action; hence it often produces sweat, and always promotes the action of sudorifics.

The same effect may be likewise produced by a different operation,—by increasing the general force of the circulation; this acts as a stimulus on the exhalant vessels, and increases their discharge. Hence violent muscular exercise is perhaps always attended with copious sweating.

In one or other of these modes, the medicines belonging to this class operate,—either by directly stimulating the cutaneous exhalant vessels, or by indirectly communicating to them an increased action by increasing the force of the circulation.

The saline diaphoretics seem to act in the former manner; they have little or no action on the vascular system, neither increasing the velocity nor force of the circulation; their action therefore is exerted on the stomach, and thence communicated to the vessels of the skin. Perhaps they may likewise be absorbed into the mass of blood, as they readily pass with the chyle, or enter the absorbent vessels, and may act more directly on the cutaneous vessels.

Those diaphoretics, on the contrary, which are more stimulating, probably act by increasing the force of the vascular system, as they usually augment the force and frequency of the pulse, previous to occasioning sweat.

Diaphoresis is not, however, the necessary consequence of the circulation being increased in force; for it often happens that the pulse is frequent and hard,

when the skin remains dry. In this case there seems to exist a constriction of the exhalants, sufficient to resist the impetus of the blood, and whatever can remove this will favour sweating. Diaphoresis, therefore, it may in general be said, will follow from increased vascular action, when the exhalants of the skin are not morbidly constricted; and it will take place still more copiously when the circulation is increased in the larger vessels, while the exhalants themselves are relaxed. On this view is to be explained the operation of tepid diluents, and of external warmth in promoting sweat, the tendency of both being to increase the force of the circulation, and at the same time occasion relaxation of the cutaneous vessels. From the latter effect, small doses of emetics are favourable to diaphoresis; and, from the same principle, the superior sudorific power of the combination of opium with ipecacuan, or the preparations of antimony, may perhaps be accounted for; the primary operation of the one being to increase the action of the vascular system; that of the other, by its nauseating effect, to diminish the action at the surface, as is apparent from the paleness of the skin and the sense of coldness with which nausea is attended.

The primary effects of diaphoretics are to evacuate the watery part of the blood, and thus lessen the quantity of it in the circulating system; to determine the blood to the surface from the internal parts; to increase the action of the absorbents, and to remove spasmodic stricture of the cutaneous vessels, and render the skin moist and relaxed.

It is doubtful, however, whether the first of these ef-

fects takes place to any extent; for, during sweating, there is generally considerable thirst: as much fluid may therefore be taken in, as will supply what is thrown out; and farther, the other fluid secretions, particularly that of urine, are diminished during this operation. It is probable, therefore, that little alteration takes place in the quantity of fluid contained in the body from the action of diaphoretics; and we can scarcely, in any case, ascribe any beneficial effects they produce to this cause.

The last effect is perhaps the most important; at least it is on this principle, the removing spasmodic stricture of the cutaneous vessels, that the efficacy of diaphoretics in inflammatory diseases has been explained. In such affections the skin is dry, and the external heat augmented; but when diaphoresis has been induced, that state is removed, and the skin remains moist and cool. It is with the view of producing these effects that diaphoretics are used in synocha, acute rheumatism, and in the various phlegmasiæ.

Several circumstances contributed to lead physicians to the free use of diaphoretics in fevers. The skin is generally dry and hot; and it was often observed, that a spontaneous salutary crisis was marked by diaphoresis, or even by a copious sweat. Hence it was concluded, that by following the path nature pointed out, and inducing this relaxed state of the vessels of the skin, the disease might be removed. Theory too had its influence in carrying this practice to an immoderate extent, fever being supposed to arise from the presence of morbific matter in the

system, and sweating being an evacuation by which it was supposed to be discharged. The limits to the practice have long been established; little advantage appears to be derived from it in the treatment of fevers of the typhoid type, and it is principally in the various phlegmasiæ that it is employed.

As evacuating the serous part of the blood, and as promoting absorption, sudorifics have been sometimes employed in the different species of dropsy, especially in anasarca, in which the circulation in the extreme vessels on the surface is more or less languid. Cases occur where it is not easy to increase the discharge by urine, and in these sweating has been had recourse to as less debilitating than purging, the only other evacuation that can be excited with advantage. It has been remarked too, that the operation of diaphoretics, when it has been excited, has been accompanied by an increase in the quantity of urine, a proof of absorption having been promoted. It is difficult, however, to excite sweating in dropsy, and the practice is rarely attempted.

By determining to the surface, and preserving a gentle diaphoresis, they are found serviceable in asthma, dyspepsia, habitual diarrhœa, chronic dysentery, and chronic rheumatism.

In various obstinate cutaneous affections, as herpes and lepra, advantage has been derived from the use of diaphoretics, probably from altering the morbid state of the extreme vessels on the surface. The use of the warm bath,

and the antimonial and mercurial diaphoretics, are found more particularly serviceable in such affections.

Several circumstances require to be attended to in the administration of sudorifics. If the disease is inflammatory, the action of the vascular system strong, and the skin dry, with great heat on the surface, those which are of the stimulating kind are to be avoided, as if they fail in producing sweat, they may aggravate the symptoms. The free use of warm diluents is proper and even necessary, under the operation of full sweating. The patient should be laid in flannel, not only as preserving the temperature more uniform, but also as it absorbs the moisture which would otherwise carry off the heat too rapidly, and cool the surface. The covering ought rather to be light, as there is no necessity for much external warmth. Too much heat, especially when unaccompanied by humidity, sometimes rather prevents sweating, probably by stimulating the exhalant vessels, and increasing their force of resistance. It is promoted by partial fomentation, as the application of flannel dipped in warm water, and pressed out, to the feet. Lastly, care is to be taken to avoid the application of cold, either by the admission of cold air to the surface, or the drinking of cold water while the sweat continues, or for some time after it has ceased. When the sweat is to be checked, it is best done by drying the surface, removing the patient into dry flannel, and allowing him to expose his hands and arms to the air.

The particular diaphoretics may be arranged according to the affinity in their operation, as they operate by increasing the action of the vascular system, or as they act without any sensible stimulant operation, though it is somewhat difficult to trace the distinctions of these, or even with regard to every individual to assign the kind of action it exerts.

DIAPHORETICS.

ACETAS AMMONIÆ.
CITRAS AMMONIÆ.
CARBONAS AMMONIÆ.
MURIAS AMMONIÆ.
SUB-MURIAS HYDRARGYRI.
ANTIMONIUM.
SULPHUR.
OPIUM.
CAMPHOR.
GUAIACUM OFFICINALE.
DAPHNE MEZEREUM.
LAURUS SASSAFRAS.
SALVIA OFFICINALIS.

ACETAS AMMONIÆ. Acetate of Ammonia.

ALL the ammoniacal salts are supposed to have a diaphoretic power. The acetate is the one which has been principally used; its solution (Aqua Acetatis Ammoniæ) having been long celebrated under the name of Spirit of Mindererus (Spiritus Mindereri) as a diaphoretic in febrile affections. It is prepared by neutralizing distilled vinegar, by adding to it carbonate of ammonia, the carbonic acid being disengaged with effervescence, and the acetate of ammonia remaining in solution. Its strength must be various, according to the degree of concentration of the vinegar, and hence it is given in divided doses, an ounce being given every hour or two, and its operation promoted by tepid diluents and the sweating regimen. As it produces no increase of vascular action, it has been supposed well adapted to exhibition in inflammatory fevers, as synocha and acute rheumatism, and it is in such cases that it is usually employed. Its diaphoretic power, however, there is reason to suspect, is not very great, though it may be employed perhaps with some advantage when its operation is promoted by the addition of small proportions of opium and antimony. Externally it is used as a discutient, and sometimes as an application to inflamed parts.

CITRAS AMMONIÆ. Citrate of Ammonia.

LEMON juice, neutralized by potash, affords a remedy, which has long been employed under the name of Saline Mixture, as a refrigerant in fever. When it is neutralized by ammonia, it is supposed, along with its refrigerant, to have a diaphoretic power. Citric acid being the chief constituent ingredient of the juice of the lemon, this preparation is of course a citrate of ammonia. In the diluted state in which the mixture is prepared, it can have no great power; but its diaphoretic operation is sometimes promoted by the addition of a few drops of tincture of opium and antimonial wine.

CARBONAS AMMONIÆ. Carbonate of Ammonia.

THIS salt is employed either under the solid form, or in a state of solution. In the former state, it is obtained by sublimation from a mixture of muriate of ammonia and carbonate of lime, the heat applied giving rise to a double decomposition, and the carbonate of ammonia being sublimed. It forms a concrete mass, white and efflorescent, which retains the pungent ammoniacal odour, and which, as it also changes the vegetable colours to a green, is probably to be regarded as a sub-carbonate. Its solution (Aqua Carbonatis Ammoniæ) is prepared by distilling water from a mixture of muriate of ammonia and sub-carbonate of potash, carbonate of ammonia being formed, sublimed, and dissolved by the water which distils over. Under either form it is used as a stimulant, and

sometimes as a sudorific, its dose being 10 or 15 grains of the concrete salt, and from half a drachm to a drachm of the solution. Its operation is promoted by the sweating regimen. As a stimulant, the solution is given in a similar dose in languor or faintness; and the concrete salt is applied to the nostrils, forming what is named the pungent smelling salt.

MURIAS AMMONIÆ. Muriate of Ammonia. Sal Ammoniacus. Sal Ammoniac.

THIS salt is prepared by various processes, on a large scale, for the purposes to which it is applied in the arts. The greater number of these consist in obtaining an impure ammonia from animal substances by distillation, combining it with sulphuric acid, and decomposing this sulphate of ammonia by muriate of soda, the muriate of ammonia formed from the mutual action of these compound salts being sublimed. It is thus obtained in a solid dense mass, somewhat ductile and semi-transparent. It is soluble in about three parts of cold water, and may be crystallized from its hot solution. In medical practice it is little employed. It has been supposed, in the dose of one drachm, to act either as a diuretic or diaphoretic, according to the mode in which it is administered; the first effect being obtained when the surface of the body is kept cool; the other when external warmth is applied, with the use of tepid diluents. It is also sometimes applied externally as a discutient, dissolved in dis-

tilled vinegar. But it has a place in the Pharmacopœias principally as being employed in pharmacy.

HYDRARGYRI MURIAS MITIS. Sub-murias Hydrargyri. Mild Muriate of Mercury. Sub-muriate of Mercury or Calomel. (Page 361.)

THIS preparation of mercury is sometimes employed to obtain its action on the cutaneous vessels; and in certain diseases, particularly eruptions on the surface, and chronic rheumatism, has been supposed to prove useful by increasing the insensible perspiration. Combined with opium, or with guaiac, it has been supposed to exert a still greater degree of diaphoretic power.

ANTIMONIUM. Antimony. (Page 315.)

A sympathy appears to exist between the stomach and the surface of the body, in consequence of which, the state of the one is to a certain extent communicated to the other; the nauseating effect, for example, of emetics being accompanied with diminished action at the surface. This effect is apparently produced by the preparations of antimony; and some of them, particularly the oxide of antimony with phosphate of lime, and the tartrate of antimony and potash, are hence employed as diaphoretics in febrile affections. The former is given in a dose from 5 to 10 grains, repeated every third or fourth hour, until its operation as a sudorific, cathartic or emetic, is produced; the latter being given in a dose of one-half or one-fourth of a grain in a similar manner. The action

of both is aided by warm diluents, and sometimes that of the tartrate of antimony and potash is rendered more certain and powerful by combination with opium. The sulphuret of antimony levigated has been employed as a remedy in some cutaneous diseases, and chronic rheumatism; and has been supposed to operate by increasing the insensible perspiration.

SULPHUR. Sulphur. (Page 349.)

SULPHUR, it has already been remarked, passes off by the cutaneous vessels, and with some increase, it has been supposed, of the insensible perspiration. Hence has been explained the advantage sometimes derived from it in habitual dyspnœa, and in chronic cattarh. The solution of it in oil, Oleum Sulphuratum, has been used in the same cases, but is a preparation both acrid and nauseous.

OPIUM. Opium. (Page 158.)

OPIUM, in a pretty large dose, produces sweat, particularly when its operation is promoted by diluents and external warmth. It is difficult, however, to employ it alone as a sudorific, from its narcotic power being necessarily exerted at the same time. But by combination with antimony or ipecacuan, a modification of power is produced, more important perhaps than any other arising from the combination of remedies: the narcotic operation of the opium is in a great measure prevented, the nauseating effect of the ipecacuan or antimony is also diminished, and we obtain a sudorific more powerful and certain

than any other. In the combination with antimony, thirty-five drops of antimonial wine are usually added to twenty-five of tincture of opium. The combination with ipecacuan is still more powerful. It is an officinal preparation (Pulvis Ipecacuanhæ et Opii), and consists of one part of ipecacuan, one of opium, and eight parts of sulphate of potash; these being rubbed together into a fine powder, the sulphate of potash rendering this more easy by dividing the opium, and lessening its tenacity. This has long been celebrated as a sudorific, under the name of Dover's Powder, and is the medicine which is uniformly employed where copious sweating is to be induced, as in acute rheumatism, in anasarca, and in every other disease in which this indication is to be fulfilled. Its medium dose is ten grains, given generally in a bolus; its operation is promoted by tepid diluents and external warmth, the patient being confined to bed. If it fail in producing sweat, other five grains may be given at the end of an hour, and sometimes even it is necessary to give a larger dose. When it operates, the sweating is generally profuse, and by the proper management can be kept up for several hours. The power of the combination probably depends on the joint action of the opium and ipecacuan, the former increasing the force of the circulation, the latter, by its action, propagated to the surface, diminishing the resistance in the exhalant vessels, and causing, therefore, the fluid to be more easily and copiously poured out. Such is the effect of this modification, that the combination can be given with safety in

pure inflammatory affections, attended with increased vascular action, where the exhibition of opium alone would be attended with hazard.

CAMPHORA. Camphor. (Page 154.)

CAMPHOR has been employed as a diaphoretic in acute rheumatism, in different forms of fever, and in several of the exanthemata, particularly small pox, in a dose from 5 to 15 grains. Its operation as a sudorific is not sufficiently certain, however, when it is given alone. Sometimes it is combined with nitre, with antimonials, mild muriate of mercury or opium.

GUAIACUM OFFICINALE. Guaiac. *Decand. Monogyn. Gruinales. Lignum et Gummi resina. South America and West Indies.*

THE wood of this tree, and a concrete resinous substance obtained by exudation from incisions in its trunk, are the parts of it used in medicine.

The wood is hard and heavy, of a yellowish colour, has little smell, and a slightly warm bitter taste. Its virtues depend on the small portion of resinous matter which it contains.

Guaiac wood was introduced into practice as a remedy in the treatment of lues venerea, and was at one time even considered capable of effecting a radical cure. Its powers are now better ascertained. It is employed merely as an auxiliary, and sometimes with advantage, in promoting the action of mercury in the confirmed state of the disease, and in alleviating the various symp-

toms which arise from a protracted mercurial course. It is likewise occasionally prescribed in cutaneous diseases, in scrofulous affections, and in chronic rheumatism. The form under which it is administered, is always that of decoction, for which a formula is given in the Pharmacopœias. A quart of this is drunk in the course of the day. If taken warm it produces diaphoresis.

Offic. Prep.—Dec. Guaiac. Off. Comp. *Ed.*

GUAIACUM. Gummi-Resina.

This is obtained by exudation from incisions made in the trunk of the guaiac tree. It is friable, of a greenish or greyish colour, and resinous lustre, has an odour somewhat fragrant, and a warm bitterish taste. It was usually regarded as a gum-resin, but the experiments of Mr Brande have shewn that it possesses some peculiar properties, whence it has been regarded as a distinct principle. It is very liable to changes of colour, apparently from the action of oxygen. Its powder is at first of a grey colour, but becomes green from exposure to the air; and when its solution in alkohol is decomposed by acids, the precipitate assumes various tints of colour. When acted on by concentrated nitric acid, it affords oxalic acid; by the diluted acid a product is formed more highly resinous. It is almost entirely soluble in alkohol. Water by digestion on it dissolves a little extractive matter.

Guaiac is a stimulating medicine, proving diaphoretic in a dose of about half a drachm, and purgative in a larger dose. It is a remedy employed in chronic rheuma-

tism, being given so as to excite sweat, or more usually in smaller doses to keep up a gentle diaphoresis. Its sudorific power is promoted by opium or the preparations of antimony. It is given either in substance in the form of bolus, or diffused in water by the medium of mucilage, or in tincture. The tincture of it in spirit of ammonia is more highly stimulating than that in proof-spirit, and is generally preferred.

Offic. Prep.—T. Guajac. T. Guajac. Amm. *Edin. Lond. Dub.*—Mist. Guaiac. *Lond.*

Daphne mezereum. Mezereon. *Pentand. Monogyn. Vepreculæ. Cortex radicis. Indigenous.*

The bark of the root of this plant is the part of it used in medicine: its taste when it is chewed for some time is extremely acrid; but this acrimony is somewhat impaired by drying; it is extracted by water and by vinegar.

Mezereon is a stimulating diaphoretic, which, by determining to the surface of the body, has been found of service in chronic rheumatism, and in cutaneous diseases. Its principal medicinal application has been in syphilis; and it has been regarded as peculiarly efficacious in removing venereal nodes, and thickening of the ligaments and periosteum, and in disposing ulcerations to heal. It is given in the form of decoction; 2 drachms of the bark, with half an ounce of liquorice root, being boiled in 3 pounds of water, to 2 pounds, and 4 or 6 ounces of this decoction being given four times a-day. From its acri-

mony it is somewhat liable to excite nausea, hence it is often given in a weaker decoction, and combined with guaiac and sarsaparilla. Such a combination forms the Decoctum Sarsaparillæ Compositum, an improved formula for the Lisbon diet drink, which has been so highly celebrated in the treatment of these affections.

Offic. Prep.—Dec. Daphn. Mez. *Ed.*

Laurus sassafras. Sassafras. *Enneand. Monogyn. Oleraceæ. Lignum. America.*

This wood has a moderately fragrant smell, and a sweetish aromatic taste. It affords an essential oil by distillation, and yields to water, by infusion or decoction, its flavour, and part of its taste. It is slightly stimulant and diaphoretic. Its infusion has been drunk freely in cutaneous diseases, and in chronic rheumatism; and it is frequently added to decoctions of sarsaparilla, guaiac and mezereon, probably without communicating any real virtue.

Offic. Prep.—Ol. Laur. Sassaf. *Ph. Ed.*

Salvia officinalis. Sage. *Diand. Monogyn. Verticillatæ. Folia. South of Europe.*

The leaves of this shrub have an aromatic smell, and a warm bitterish taste. Its aqueous infusion drunk warm, has been used to produce sweat, or to promote the action of sudorifics; the aromatic quality of the sage adding something perhaps to the power of the warm diluent.