CHAP. XII.

OF EXPECTORANTS.

Expectorants have been defined, those medicines which facilitate, or promote the rejection of mucus, or other fluids from the lungs and trachea. The theory that has been given of their mode of operation is extremely obscure and hypothetical. It has been supposed, that in certain diseases, a greater quantity of serous fluid is thrown out by the exhalant vessels in the lungs than the absorbents can take up, and that expectorants facilitate the rejection of this fluid. But as expectoration of this kind is a complicated, and partly voluntary operation, dependent on the action of a variety of muscles, it is difficult to perceive how these remedies can produce this effect. There are only two classes of medicines which seem capable of promoting expectoration in this manner, powerful stimulants, which, when extreme debility is present, may promote it by giving vigour to the voluntary muscles exerted in this operation, and emetics, which, by exciting vomiting, compress the thoracic viscera, and by calling all the neighbouring muscles into strong action, and rendering both expiration and inspiration more

forcible, may facilitate the expulsion of matter from the cavity of the lungs. But these exert no specific action, and are therefore not entitled to the appellation of expectorants; nor indeed are they usually considered as such.

If, therefore, by expectorants, are understood substances capable of promoting, by some specific action on the parts concerned, the expulsion of fluid from the lungs, there seems no reason to believe in the existence of such remedies.

Dr Cullen, after admitting the difficulty of giving a satisfactory theory on this subject, supposes that the promoting of expectoration by these remedies may be owing to their "increasing the secretion of the liquid, that is, to afford a mucus: this, as it is poured from the arteries into the follicles, being always a thin fluid, it may dilute the mucus in the follicles, and may cause it to be poured out from these in a less viscid state, and thereby render it more easy to be brought up by coughing, that is, to be more freely expectorated."

It is possible that some expectorants may act in this manner; but the action of the different individuals belonging to the class, and especially their action in different diseases, cannot always be explained on this principle. It is probable that there are several modes of operation, in which certain medicines may appear to promote expectoration, and which may give them a claim to the title of expectorants.

In the first place, by removing constriction on the ex-

halant vessels in the lungs, expectoration will appear to be promoted. From this constricted state, the usual quantity of fluid is not thrown out to lubricate these parts: expectoration must of course be more scanty than usual; and if medicines be given capable of removing the constriction, expectoration will become more copious. At the same time, the disease will be at least partially relieved, as that morbid state of the vessels, from which some of its symptoms originate, is removed. It is apparently by such a mode of operation that the promoting of expectoration is of service in pneumonia, catarrh, and asthma, the principal diseases in which expectorants are employed.

The remedies by which such an effect is induced, according to this mode of operation, must be principally those belonging to the class of antispasmodics, or those which have the power of inducing nausea, either of these being capable by their action of removing constriction of the exhalant vessels.

It is not possible, however, to reduce all the medicines ranked as expectorants to this mode of operation. On the contrary, some of them seem to act on a very different principle. In certain diseases, as in humoral asthma and catarrhus senilis, there seems to be, from debility of the exhalants, or from deficient action of the absorbents, an increased quantity of fluid in the lungs. There appear to be certain substances more peculiarly determined to the pulmonary vessels, as their odour is discernible in the air expired. These may stimulate the exhalant

vessels through which they pass, and by this stimulus may moderate the effusion of fluid, and thus render the expectoration of the remainder more easy. Any medicine promoting absorption of this effused fluid, will to a certain extent have a similar effect.

There is still another mode in which the quantity of fluid in the lungs may be diminished, that of determining to the surface of the body, so as to increase the insensible perspiration; and it is probable, that some of the substances which have been used as expectorants, particularly those connected with the class of diaphoretics, owe what virtues they have to this operation.

Expectorants are not then to be regarded as medicines, which assist the rejection of a fluid already secreted, or which, according to Dr Cullen's opinion, alter its consistence, and render it thin where it is too viscid, by which its expulsion is rendered more easy. They are rather to be considered either as increasing the natural exhalation, where it has been deficient, in which case the expectoration that takes place is the consequence of this, and not the cause of any relief that is afforded; or as diminishing the quantity of fluid where it is too copious, either by stimulating the exhalant vessels, increasing the action of the pulmonary absorbents, or determining to the surface of the body, by which diminution the expulsion of the remaining fluid is facilitated. On one or other of these principles, we may, with sufficient probability, explain the effects of this class of remedies, and their application to the treatment of diseases.

From this difference in the mode of operation of expectorants, it is evident that they will prove useful in opposite diseases, and that in some diseases advantage may be derived from those belonging to one division, but not from the others.

In pneumonia, where the expectoration is deficient, as this arises not from any deficiency of power to expectorate, but from a diminution of the fluid usually thrown out into the bronchiæ, owing to a constricted state of the exhalant vessels, it is evident that those expectorants, which act by removing such a state, will be most useful, while such expectorants as stimulate these vessels would be rather prejudicial. Hence the utility in such cases of nauseating doses of tartrate of antimony, or of ipecacuan; and similar advantage may be derived from their use in catarrh, and perhaps also in spasmodic asthma. On the contrary, where the effusion of fluids into the bronchiæ is too great, as in humoral asthma, or in the chronic catarrh to which old people are subject, those expectorants which are more directly stimulant, as the different balsams, and several of the gum-resins, as myrrh or ammoniacum, or those which promote absorption, as squill or foxglove, will be found more useful. In considering the particular expectorants, they may be arranged as nearly as possible according to these subdivisions.

EXPECTORANTS.

ANTIMONIUM.
IPECACUANHA.
DIGITALIS PURPUREA.
NICOTIANA TABACUM.
SCILLA MARITIMA.
ALLIUM SATIVUM.
POLYGALA SENEGA.
AMMONIACUM.
MYRRHA.
MYROXYLON PERUIFERUM.
TOLUIFERA BALSAMUM.
STYRAX BENZOIN.
STYRAX OFFICINALE.
AMYRIS GILEADENSIS.

ANTIMONIUM. Antimony. (Page 315.)

OF the preparations of antimony which have been employed as expectorants, the principal are the hydro-sulphuretted oxide, and the tartrate of antimony and potash. The first, under the forms of what are named Kermes mineral, and golden precipitate of antimony, was at one time celebrated as a remedy in pertussis and in pneumonia, in a dose of from 5 to 10 grains; but being uncertain in its strength, has fallen into disuse. The tartrate of antimony and potash is used in the same cases, and in some forms of asthma and catarrh, in the dose of one-eighth of a grain, repeated every second or third hour. It is also frequently combined with squill and other expectorants.

IPECACUANHA. Ipecacuan. (Page 329.)

IPECACUAN, operating in the same manner nearly as antimony, has like it been used as an expectorant in a dose of two or three grains. It is, however, less frequently employed.

DIGITALIS PURPUREA. Foxglove. (Page 177.)

DIGITALIS is employed with much advantage in humoral asthma,—dyspnœa aquosa, and in catarrhus senilis, obviously from its power of promoting absorption, by which it removes the fluid accumulated in the lungs ap-

parently from diminished action of the absorbents. By diminishing the quantity of this fluid, it facilitates the expectoration of the remainder, and hence appears to act as an expectorant, and it relieves the difficulty of breathing, and the irritation to which its accumulation gives rise. In such cases, it is proper to give it rather in small doses, than to push its operation to any great extent; a grain of the dried leaves, or half an ounce of the infusion daily, will be a sufficient dose.

NICOTIANA TABACUM. Tobacco. (Page 183.)

TOBACCO has been celebrated as an expectorant in chronic catarrh and humoral asthma, under the form of the watery extract, the dose of which is two or three grains. Its general action being similar to that of foxglove, it no doubt operates in these morbid affections on the same principle, though probably much inferior to the other.

SCILLA MARITIMA. Squill. (Page 331.)

SQUILL, next to its employment as a diuretic in dropsy, is most frequently used as an expectorant; and it is more particularly in those cases where there is an accumulation of the pulmonary mucus that it is prescribed; hence it probably operates by its power of promoting absorption. In inflammatory states of the system, where, from constriction of the pulmonary vessels, the exhalation is diminished, it is probably less useful; it has even been considered injurious in pneumonia, unless when

combined with tartrate of antimony. As an expectorant, it is also used in pertussis, and in that disease is frequently given in such a dose as to produce vomiting. In all these cases it is generally used under the form of the vinegar or syrup of squill, the dose of the former being half a drachm, of the latter a drachm, repeated every third or fourth hour. The squill pill is sometimes used in chronic catarrh in a dose of 10 grains daily.

ALLIUM SATIVUM. Garlic. *Hexand. Monogyn. Liliaceæ. Radix. South of Europe.*

THE root of this plant, which is of the bulbous kind, has, when recent, a fœtid smell and acrid taste. By being long kept it becomes shrivelled and inert. Its taste and smell are extracted by water by infusion; by decoction they are nearly lost. By distillation it affords an essential oil odorous and acrid.

Garlic has a considerable analogy to squill, and its operation is probably nearly the same: it acts as a diuretic, diaphoretic, and expectorant; hence its use in dropsy, rheumatalgia, and humoral asthma. Its dose is half a drachm or 2 scruples, swallowed whole, or made into pills with soap. A syrup prepared by digesting it in vinegar, and boiling the liquid with the due proportion of sugar, has been used as an expectorant. Externally garlic bruised is applied as a stimulant and rubefacient.

Offic. Prep.—Syr. Alii, *Ph. Dub.*

POLYGALA SENEGA. Seneka. Rattlesnake-root. *Diadelph. Octand Lomentac. Radix. North America.*

THIS root is in articulated shoots, of a greyish yellow colour; its taste is bitter and pungent. Its active matter is extracted partially by water with the assistance of heat, and completely by alkohol.

Seneka has been frequently employed as an expectorant in pneumonia, after the highly inflammatory stage of the disease has been subdued. Its dose in substance is from 10 to 20 grains, but it is generally used in the form of decoction, of which, when prepared according to the formula of the Edinburgh College, an ounce, or an ounce and a half may be given every second or third hour. As it operates also as a diuretic, it is probable that its efficacy depends on its power of increasing absorption, and hence that it is more adapted to those cases where there is an accumulation of fluid in the bronchiæ, than to affections of an opposite nature.

Offic. Prep.—Dec. Polygal. Seneg. *Ed. Lond.*

AMMONIACUM. Ammoniac. *Gummi-resina.*

THIS gum-resin is brought from Egypt and the East Indies; the tree which produces it having not been accurately known. The London College have now, on the authority of Wildenow, designated it as the Heracleum Gummiferum, this having been raised by that botanist from the seeds often found mixed in the gum-ammoniac of the shops. It is in large masses, or, when of the best quality, in small round fragments, yellow on the surface,

and white within. It has a faint smell, and a nauseous taste. It is partially soluble in alkohol. Water triturated with it forms a milky-like mixture, from which, on standing, a resinous matter subsides.

Gum-ammoniac is principally employed as an expectorant, and is frequently prescribed in asthma and chronic catarrh. Its dose is from 10 to 30 grains; either given under the form of pill, or diffused in water, and frequently combined with squill or tartrate of antimony. Externally it is applied as a discutient, under the form of plaster, to white swelling of the knee, and to indolent tumors, being beat into a soft mass with vinegar, and spread on leather.

Offic. Prep.—Emp. Amm. Emp. Ammon. cum Hydr. *Lond.*—Mist. Ammon. *Lond. Dub.*

MYRRHA. Myrrh. *Gummi-resina.*

MYRRH is the produce of Arabia and Abyssinia; the plant from which it is obtained has never yet been accurately described. It is in small irregular pieces of a reddish brown colour, has a smell rather fragrant, and a warm bitter taste. It consists of gum and resin; the latter appearing to constitute its active matter. Alkohol dissolves the resin, and the solution is rendered turbid by the affusion of water. Water boiled on the myrrh dissolves the gummy matter, to which part of the resin adheres, and this evaporated affords the watery extract, which is less active than the myrrh itself.

Myrrh is an expectorant, which has been regarded as

too stimulating to be employed in pneumonic inflammation, but which has been often employed in asthma and chronic catarrh, and sometimes in phthisis. Its dose is from 10 to 20 grains. The watery extract, which has been preferred by many physicians to the myrrh itself, and which is the form under which it has been used in phthisis, seems to be an injudicious preparation, as the myrrh is merely weakened in power. Myrrh is also sometimes employed in amenorrhœa. Its tincture is in common use as a stimulating application in sponginess of the gums, and sometimes also to foul ulcers.

Offic. Prep.—Tinct. Myrrh. *Ph. Ed. Lond. Dub.*

MYROXYLON PERUIFERUM. Balsamum Peruvianum. Peruvian Balsam. *Decand. Monogyn. Lomentaceæ. South America.*

THIS balsam is said to be extracted by boiling the bark and young branches of the tree with water; it has also been affirmed that it is obtained by exudation. It is thick and viscid, of a reddish-brown colour, has a strong smell somewhat fragrant, and a bitter pungent taste. It affords a small portion of essential oil by distillation, and of acid of benzoin by sublimation. Its remaining matter is resinous. It is entirely soluble in alkohol.

Peruvian balsam is considerably stimulant. It has been employed as an expectorant in catarrh and dyspnœa, more particularly in those forms of these diseases where the secretion of pulmonary mucus is increased, and may perhaps be of some advantage in stimulating the exhalants

or absorbents. It has likewise been prescribed as a remedy in paralysis, chronic rheumatism, and leucorrhœa. Its dose is from 5 to 15 grains, and it is best given diffused by mucilage, or made into pills by any vegetable powder.

Offic. Prep.—T. Bals. Per. *Lond.*

TOLUIFERA BALSAMUM. Balsamum Tolutanum. Balsam of Tolu. *Decand. Monogyn. Lomentaceæ. South America.*

TOLU balsam is obtained from incisions in the trunk of the tree; it thickens, and in time becomes concrete, and of a resinous fracture and appearance; it has a fragrant odour, and a warm sweetish taste. It dissolves entirely in alkohol, and communicates its odour and taste to water by boiling. It contains a small quantity of acid of benzoin.

This is the mildest of all the balsams. It has been used as an expectorant, and its tincture or syrup sometimes enters into the composition of mucilaginous mixtures used in cattarh, but its powers are very inconsiderable, and it is employed principally on account of its flavour.

Offic. Prep.—Syr. Toluif. Bals. *Ph. Ed. Lond.*—Tinct. Toluif. B. *Ed. Dub.*

STYRAX BENZOIN. Benzoinum. Benzoin or Benjamin. *Decand. Monogyn. Bicornes. Balsamum. India.*

THIS balsam is obtained by exudation; it is in brittle masses, composed of brown and white fragments; its

smell is fragrant; it has little taste. It consists almost wholly of resin, and is therefore nearly entirely soluble in alkohol. It likewise contains a considerable portion of that peculiar acid, which, as it exists in greater quantity in it than in any other vegetable matter, is named Benzoic acid. This is obtained from it by sublimation, or by decoction with water, and likewise by boiling it with potash or lime, with either of which it combines, and is afterwards separated by the addition of an acid. It is in white brilliant scales, retains the flavour of the benzoin, and with acidity has likewise a degree of pungency.

Benzoin is rarely employed in medicine. Its acid is used as an expectorant in asthma, in a dose of 10 or 15 grains; but it is probably a medicine of little power. It enters into the composition of the ammoniated and camphorated tinctures of opium, and is scarcely applied to any other use.

Offic. Prep.—T. Benz. C. *Ed. Lond. Dub.*

STYRAX OFFICINALE. Storax. *Decand. Monogyn. Bicornes. Balsamum. South of Europe, Asia.*

THIS substance is in masses soft and slightly unctuous, of a brown colour, with scarcely any resinous lustre or appearance; it has a strong fragrant odour, and a bitterish pungent taste. It consists principally of resin, with a small portion of benzoic acid. It resembles benzoin in its virtues; was formerly used as an expectorant, but is now little regarded. The purification of it, ordered in some of the Pharmacopœias, is altogether superfluous.

Offic. Prep.—Styrax. Purif. *Ph. Lond. Dub.*—Pil. Styrac. *Dub.*

AMYRIS GILEADENSIS. Balsamum Gileadense. Balsam or Balm of Gilead. *Octand. Monogyn. Dumosæ. Arabia.*

THIS balsam, obtained by incisions made in the trunk of the tree, is in the form of a milky juice, highly fragrant, and is so much valued in the East, that it is said not to be imported into Europe. A coarser kind is obtained by strong decoction of the branches and leaves, of a yellow colour, and thick consistence; its taste is warm and bitter; its flavour somewhat fragrant. What is met with in the shops, under the name of Balsam of Gilead, is a resinous juice having none of these qualities, and probably the produce of a different plant. It seems little superior to the finer kinds of turpentine.

The medicinal virtues of the genuine balsam of Gilead have been very highly extolled, undoubtedly with much exaggeration. The common balsam is scarcely used; but its qualities seem to be similar to those of the balsam of Peru, with more acrimony.