
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 exhalent 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 any such 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 the 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 en-

titled 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 appears to be 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 dilate 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. There appear indeed to be several modes of operation, by which certain medicines promote expectoration, and which give them a claim to the title of expectorants.

In the first place, by removing constriction on the exhalent 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 are 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 ori-

ginate, is removed. It is apparently by such a mode of operation that the promoting of expectoration is of service in pneumonia, inflammatory 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 exhalent vessels. The antimonial preparations, which are perhaps the most powerful expectorants, appear to operate on this principle. Opium must operate in a similar manner.

It is not possible, however, to explain the effect of all the medicines ranked as expectorants from 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 is, from debility of the exhalents, or from deficient action of the absorbents, an increased quantity of fluid in the lungs. Some medicines have been supposed to promote its expectoration: but it is more probable that any relief they afford is by diminishing its quantity. 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 exhalent 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 another mode, too, 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 exhalent 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 diversity of operation, it is evident that expectorants will prove useful in opposite diseases, and that in some morbid affections 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 exhalent 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 this case of nauseating doses of tartrate of antimony, or of ipecacuan; and similar advantage may be derived from the use of these remedies 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, so far as they have any efficacy, 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.

MYLOXYLON PERUIFERUM.

TOLUIFERA BALSAMUM.

STYRAX BENZOIN.

STYRAX OFFICINALE.

AMYRIS GILEADENSIS.

ANTIMONIUM. Antimony. (Page 307.)

ANTIMONY, it has already been remarked, is in use as an expectorant, and probably operates by its power of removing constriction of the exhalents, and thereby favouring the effusion of fluid into the mucous cells of the lungs, when from an inflammatory state this secretion had been suppressed. It of course then apparently causes expectoration. Of the preparations of it 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 precipitated sulphuret 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 cases 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, to promote their operation.

IPECACUANHA. Ipecacuan. (Page 320.)

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. Advantage is sometimes derived from it in this dose continued for some time in chronic asthma.

DIGITALIS PURPUREA. Foxglove. (Page 162.)

DIGITALIS is employed with 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 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 this 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, twenty drops of the tincture, or half an ounce of the infusion daily, will be a sufficient dose.

NICOTIANA TABACUM. Tobacco. (Page 167.)

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 probably operates in these morbid affections on the same principle, though it is much inferior in efficacy.

SCILLA MARITIMA. Squill. (Page 322.)

SQUILL, the history of which has been given as a diuretic, is one of the principal expectorants. It is used more peculiarly in those cases where there is an accumulation of the pulmonary mucus; hence it probably operates by its power of promoting absorption, thereby diminishing the quantity of fluid effused, and thus facilitating the expectoration of the remainder. By stimulating the exhalents of the

lungs, where they are in a debilitated state, it may also lessen the secretion where it is too abundant. In inflammatory states of the system, where, from constriction of the pulmonary vessels, the exhalation is diminished, it is less useful; it has even, from its acrimony and stimulating quality, been considered injurious in pneumonia, unless when the state of active inflammation has subsided, or when it is given so as to have its stimulating operation diminished by combination with nitre, or with tartrate of antimony. As an expectorant, it is also used in pertussis, and when the removal of that disease is attempted by exciting vomiting at intervals, it is the emetic usually prescribed. In all these cases it is generally used under the form of the vinegar or the syrup of squill, the dose of the former being half a drachm, of the latter a drachm, repeated every third or fourth hour, with the view of promoting expectoration, or considerably larger when it is intended to produce vomiting. 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 bulbs of the root of this plant have, when recent, a fœtid smell and acrid taste. By being long kept, they become shrivelled and inert. Their taste and smell are extracted by water by infusion; by decoction they are nearly lost. By distillation they afford an essential oil odorous and acrid.

Garlic has a considerable analogy to squill in its qualities and operation: it acts as a diuretic, diaphoretic, and expectorant; hence its use in dropsy, rheumatism, and humoral asthma: it has also been employed with some success in the treatment of intermittent fever; and as a stimulant in dyspepsia. 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 used as a stimulant and rubefacient: it is applied to the soles of the feet, to relieve coma in fever; its juice is sometimes introduced into the ear in cases of deafness.

Offic. Prep.—Syr. Alii, *Dub.*

POLYGALA SENEGA. Seneka. Rattlesnake-root. *Dia-*
delph. 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 principally by water with the assistance of heat, and completely by alcohol.

Seneka has been employed as an expectorant in pneumonia, after the highly inflammatory stage of the disease has been subdued, and also in pertussis and chronic catarrh. 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. It is however little used.

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

AMMONIACUM. Ammoniac. Heracleum Gummiiferum.
Pentand. Digyn. Umbellatæ. Gummi-resina.

THIS gum-resin is brought from Egypt and the East In-

dies ; but the tree which produces it has not been accurately described. Wildenow, however, succeeded in raising, from the seeds often found mixed in the gum-ammoniac of the shops, a vegetable which he has described, and named *Heracleum Gummiferum* ; and the London College have, on his authority, inserted it as the plant which affords ammoniac. It appears that the gum-resin is yielded by exudation. 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 alcohol. Water triturated with it forms a milky-like mixture, from which, on standing, a resinous matter subsides.

Ammoniac is principally employed as an expectorant, and is sometimes prescribed in asthma and chronic catarrh, probably with little benefit. Its dose is from 10 to 20 grains ; either given under the form of pill, or diffused in water, and frequently combined with squill or tartrate of antimony. Sometimes, too, it is used as an emmenagogue, usually combined with myrrh, or with preparations of iron. 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 consti-

tate its active matter. Alcohol dissolves the resin, and the solution is rendered turbid by the affusion of water. Water boiled on the myrrh dissolves the mucilaginous 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 where there is little tendency to inflammatory action. Its dose is from 10 to 20 grains: and to lessen its stimulating operation, it is not unfrequently combined with nitre, or with super-tartrate of potash. The watery extract, which has been preferred by many physicians to the myrrh itself, and which is a 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, usually combined with iron. 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. *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 alcohol.

Peruvian balsam is considerably stimulant. It has been employed as an expectorant in catarrh and dyspnoea, more particularly in those forms of these diseases where the secretion of pulmonary mucus is increased; and from its stimulating action on the stomach, or from a similar action on the exhalents or absorbents of the lungs, may be attended with some advantage. 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. Its tincture has been employed as a stimulating application to foul ulcers.

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 is of a brown colour, has a fragrant odour, and a warm sweetish taste. It dissolves entirely in alcohol, and communicates its odour and taste to water by boiling. It contains a small quantity of acid of benzoin, which is expelled from it by the application of heat.

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 catarrh, but its powers are very inconsiderable, and it is employed principally on account of its flavour.

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

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

THE tree which affords the concrete balsam named Benzoin, is a native of Sumatra. It yields it by exudation from incisions which are made in the bark of the stem. Benzoin 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 alcohol. 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 has been prescribed 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.*

THE resinous juice afforded by the storax-tree, from inci-
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sions made in the bark of the stem, is, in the state in which it is imported from the Levant, very impure, from the intermixture of saw-dust, and sometimes of earthy matter. It is in masses soft and slightly unctuous, of a brown colour, with scarcely any resinous lustre or appearance; it retains, however, a strong fragrant odour, and has 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.

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

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

THIS balsam is obtained from incisions made in the bark of the trunk of the tree; it 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; and its flavour is 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. Even the inferior balsam, that said to be procured by decoction, is not easily procured, so that it is never used in European practice; but its qualities seem to be similar to those of the balsam of Peru, with more acrimony.