contrary, in the most of these cases, he has obtained either a cure or a notable amendment" (Trousseau et Pidoux).

Certain acute affections of the broncho-pulmonary mucous membrane are much benefited by non-emetic doses of ipecacuanha; for example, *acute catarrh of the nasal and bronchial mucous membrane, hay-asthma, capillary bronchitis.* An emetic dose will cut short an attack *of laryngismus stridulus.* An occasional emetic gives great relief in *whooping-cough*, when there is profuse bronchial secretion. Non-emetic doses of the fluid extract (♏ j—♏ iij) diminish the violence of the spasms in this disease. Nauseating and emetic doses are serviceable in the attacks of *spasmodic asthma*, but the good effects of the remedy are lost by repetition. Ordinary *colds*, especially in children, are benefited by doses sufficient to produce slight nausea but not vomiting. A troublesome cough at night, which prevents sleep, may not unfrequently be arrested by a dose at bed-hour of some one of the ipecacuanha preparations. For these various purposes the wine or the fluid extract may be used, but the latter preparation is much more trustworthy and effective than the former.

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Antimonii et Potassii Tartras.—*Tartrate of Antimony and Potassa.*—Tartar-emetic.

This is a powerfully spoliative and depressing emetic, which has already been discussed under the head of "Agents promoting Destructive Metamorphosis." It was formerly much employed as an emetic in croup, capillary bronchitis, and at the onset of fevers and inflammations; but the local irritation, as well as the systemic depression which follows its use, has led to its almost entire abandonment for these purposes.

Administration.—Six grains may be dissolved in four ounces of water, and a tablespoonful be given every fifteen minutes until emesis occurs. Ipecacuanha and tartar-emetic are frequently administered together—twenty grains of the former and two grains of the latter.

CATHARTICS.

Purgatives are divisible into several groups, according to the nature of their action.

Laxatives are medicines which stimulate the intestinal movements, without increasing to any considerable extent, at least, the intestinal secretions.

Saline Purgatives excite increased secretion, while at the same time they hasten the peristaltic action. The dejections which are produced by them are loose and watery.

Mercurial Purgatives, chiefly calomel and blue mass, exert an influence peculiar to themselves. Without expressing an opinion at present, for or against their supposed cholagogue effects, the author believes that they differ so much in their action from other purgatives as to be appropriately placed in a separate class.

Tonic-astringent and Resin-bearing Purgatives.—These affect the liver and the glandular appendages of the mucous membrane, and increase the tonicity of the muscular layer of the intestine. They increase the proper secretion of the glands, and do not merely cause an outward osmosis of fluid from the vessels.

Hydragogue Purgatives act with great energy, and not only increase the glandular secretions, but cause a very abundant outward diffusion, so that the dejections which they produce are extremely watery. This group of purgatives also excite very rapid and violent peristaltic movements.

Laxatives.—Manna.—*Manna.* The concrete, saccharine exudation, in flakes, of *Fraxinus ornus* Linné (Nat. Ord. *Oleaceæ*). Dose, ʒ j—ʒ ij, according to age.

Composition and Properties.—Manna has a sweetish, rather mawkish taste; is soluble, when pure, in three parts of cold water, and in its own weight of boiling water. It contains a sugar—*manna-sugar* or *mannite*, which constitutes from seventy to eighty per cent of the best specimens of manna. It is said to contain dextrin, or a mucilage having similar reactions, and ether extracts from it in small quantity a slightly acrid, reddish-brown resin, on which the laxative property of manna probably depends.

Actions and Uses.—Manna is a very mild laxative, but, when administered alone, is apt to cause griping. It is rather slow in its operation, but is free from irritating qualities, and leaves no unpleasant after-effects. It is most frequently combined with other purgatives—senna chiefly—the operation of which it aids, and at the same time renders less drastic. It is rarely given alone, and only to chil-

dren and pregnant women. Formerly it was used as a laxative in hæmorrhoidal affections.

Sulphur.—*Sulphur lotum* (washed sulphur). *Sulphur sublimatum* (sublimed sulphur). Washed sulphur only should be used as a laxative. Sublimed sulphur contains a trace of acid which imparts to it a griping quality. Dose, ʒ j— ʒ iij.

Actions and Uses.—Sulphur is insoluble in water, but dissolves in alkaline solutions and in the volatile and fixed oils. In the small intestine, sulphur is placed under favorable conditions for absorption. That it does enter the blood is proved by the fact that it appears in the perspiration, urine, milk, etc. Silver coins, carried in the pockets of those taking sulphur, are discolored by the formation of the sulphide of silver. Considerable sulphureted-hydrogen gas is produced as a result of the chemical changes in the intestines, and a quantity of offensive flatus is an unpleasant sequel of its administration. The intestinal secretions are somewhat increased by it, and the stools are therefore softer. It is a very mild laxative. Combination of sulphur and bitartrate of potassa or magnesia is occasionally resorted to, especially in domestic practice, for the purpose of increasing the laxative action.

Sufficient attention has already been paid to the sulphur compounds, and it only now remains to speak of sulphur as a laxative. It is used chiefly to render the stools softer and more easily voided in cases of *hæmorrhoids, fissures of the anus,* and after *surgical operations about the pelvic organs.* It is used also as a laxative in *skin-diseases, chronic rheumatism, sciatica,* and *lead-cachexia,* conjoined usually with sulphur-baths, the sulphurous mineral waters, and other appropriate medication.

Pulvis Glycyrrhizæ Compositus is an efficient laxative. It is made as follows: Senna-leaves, eighteen parts; licorice-root, sixteen parts; fennel-seeds, eight parts; washed sulphur, eight parts; refined sugar, fifty parts. M. Sig.: A teaspoonful at a dose.

Magnesia.—*Magnesia.*—Light magnesia. A white, very light and very fine powder, slowly absorbing carbonic acid from the air, odorless, having an earthy but no saline taste, and a faintly alkaline reaction when moistened with water. It is almost insoluble in water, or in alcohol, etc. Dose, ʒ ss— ʒ ij, or more.

Magnesia Ponderosa.—Heavy magnesia. A white, dense, and very fine powder, corresponding in all other properties to the above. Dose, ʒ ss— ʒ ij.

Magnesii Carbonas.—Carbonate of magnesia. Light, white, friable masses, or a light, white powder, odorless and tasteless, insoluble in alcohol, and almost insoluble in water. Dose, ʒ ss— ʒ ij.

Mistura Magnesiæ et Asafœtidæ.—Mixture of magnesia and asafœtida. (Carbonate of magnesium, five parts; tincture of asafœtida, seven parts; tincture of opium, one part; sugar, ten parts; and sufficient distilled water to make up one hundred parts. Dewees's formula.) Dose, one fourth to one teaspoonful.

Actions and Uses.—A mild antacid laxative. In the stomach it neutralizes any free acid it meets with, and the resulting salt has a laxative action. It is used to correct *acidity,* the carbonate being preferred when there is an irritable state of the stomach, because the carbonic acid, which is set free by the action of the stomach acid, is a local sedative and anodyne. If magnesia does not enter into combination with the stomach acid, no laxative effect is produced. Under these circumstances a solution of citric acid or lemonade, taken after the magnesia, will cause it to act. Magnesia is a useful antacid and laxative in *sick-headache,* especially when accompanied by acidity and constipation. It has been employed also in *gouty affections,* and in *lithiasis* (uric acid); but it is much inferior to the potash salts in these affections. In the intestinal indigestion of infants, attended with flatulence, magnesia is much prescribed in conjunction with carminatives. Dewees's formula for *flatulent colic* and *diarrhœa* in infants has been made official, and is given above as *Mistura Magnesiæ et Asafœtidæ.* The carminative of Dalby is similar in composition: ℞ Magnesii carbonat, ʒ ij; ol. menth. pip., gt. j; ol. myrist., gtt. ij; ol. anisi, gtt. iij; tinct. castor., gtt. xxx; tinct. asafœtid., gtt. xv; tinct. ol. hedeomæ, gtt. xv; tinct. cardam. comp., gtt. xxx; aquæ menthæ pip., ℥ ij. M. Sig.: *A teaspoonful, as necessary.*

Magnesia is frequently combined with other purgatives because of its antacid property. The following is Meigs's formula, gelsemium having been substituted for henbane: ℞ Magnesii carb., ʒ ss; magnesii sulphat., ʒ iij; spts. ammoniæ aromat., ʒ j; tinct. rhei, ℥ ss; tinct. gelsemii, ʒ ss; aquæ menthæ pip., ℥ iv. M. Sig.: *A tablespoonful two or three times a day.*

It is unsafe to use magnesia in large quantity for lengthened periods, owing to the fact that it may form intestinal concretions—a hydrate of magnesia. Instances of this kind have been reported.

Freshly-precipitated hydrate of magnesia is an antidote to arsenious acid in solution, but it is not so effective as the hydrated sesquioxide of iron.

Oleum Ricini.—*Castor-oil. Huile de ricin,* Fr.; *Castoröl,* Ger. A fixed oil expressed from the seed of *Ricinus communis* Linné (Nat. Ord. *Euphorbiaceæ*). Dose, ʒ j— ℥ j.

Properties and Composition.—Castor-oil has a pale amber-color, a rather nauseous taste, and is quite viscid. Cold increases the viscidity. It has a specific gravity of about 0·96. It contains several fatty

acids—*palmitic* and *ricinoleic*—the latter peculiar to castor-oil. The seeds appear to contain a drastic constituent, which is more powerfully purgative than the oil. The purer the oil, the less active its purgative property.

Actions and Uses.—Castor-oil is a mild but very certain and efficient laxative. It operates in from four to six hours, causing but little pain, and producing copious stools. It increases but slightly the intestinal secretions—hence the stools are not very liquid. Its purgative principle enters the blood, and the milk of the mother may in this way acquire a purgative property. It does not appear to have any effect upon the hepatic secretion. Röhrig's experiments, which demonstrated this point, have been confirmed by the subsequent investigations of Rutherford and Vignal. After the action of castor-oil has been completed, it may not unfrequently be seen floating on the stool; yet Buchheim (Husemann) has been unable, after careful examination of the fæces, to discover in them castor-oil or any of its derivatives.

Castor-oil is justly held in great esteem as a *laxative for children, for pregnant women, for the puerperal state.* When *hardened fæces* and *irritating substances* are to be removed from the intestinal canal, castor-oil is the most efficient purgative compatible with safety. When *inflamed hæmorrhoids, fissures of the anus*, or *surgical operations on the pelvic viscera*, require the use of a mild, certain, but unirritating laxative, castor-oil should be selected. Unfortunately, its taste is so repugnant to many palates, that no considerations will overcome the disgust which it excites. No remedy is more useful in the *diarrhœa of children*, induced and maintained by undigested aliment or irritating secretions. It is judicious practice, in these cases, to give a laxative dose of castor-oil to empty the canal, and follow it with an opiate or enema of laudanum. The *dysentery of children*, and *sporadic dysentery of adults*, especially after the more acute febrile symptoms have subsided, are generally very successfully managed by an emulsion of castor-oil: ℞ Ol. ricini, ʒ j; mucil. acaciæ, syrup. simplicis, āā ʒ ss; aquæ cinnamomi, ʒ ij. M. Sig.: *A tablespoonful every four to six hours.* In cases of dysentery, when there are much pain, tenesmus, and frequent passages, ten to twenty drops of laudanum may be added to each dose; when there are much depression, a low state of the arterial tension, and a dry, glazed tongue, five drops of turpentine may also be added.

A poultice made of the leaves of the castor-oil plant applied to the breasts, it is said, has the power to promote the secretion of milk. Warm applications to the mammæ undoubtedly stimulate their functional activity, but it is questionable whether castor-oil leaves have a special galactagogue property. It is said, however, that the inhabitants of the Cape Verd Islands have long been acquainted with this supposed property. The internal use of a fluid extract of the leaves has also, it is supposed, the power to determine an increased secretion of milk. Jaborandi will probably prove to be more effective in this respect than the ricinus communis.

Saline Purgatives.—Many of these have been discussed elsewhere; some of them are no longer employed in medical practice. The sulphate and the citrate of magnesium may be regarded as typical representatives of the class, and hence, in a statement of their physiological actions and therapeutical applications, may be comprehended all that is of immediate and practical value on the subject.

Magnesii Sulphas.—Sulphate of magnesium. *Sulfate de magnésie*, Fr.; *Bittersalz*, Ger. In colorless crystals, which slowly effloresce on exposure to the air, and are very soluble in water. Dose, ʒ j—ℨ j.

Magnesii Citras Granulatus.—A white, coarsely-granular salt, deliquescent on exposure to air, odorless, having a mildly acidulous, refreshing taste, and an acid reaction. Soluble with copious effervescence in two parts of water at 60° Fahr.; almost insoluble in alcohol. Dose, ʒ j—ʒ iv.

Liquor Magnesii Citratis.—Solution of citrate of magnesia. Dose, ℨ iv—ℨ viij. A tablespoonful of the granular salt added to a half-tumblerful of water, and drunk during effervescence, is the quantity and the form in which it may also be taken. The bottled solution, which is also highly effervescent, must be drunk immediately on being poured out. It is a pleasant drink, and, when properly prepared, an active cathartic.

Physiological Actions of Saline Purgatives.—As a general rule, saline cathartics are easily borne by the stomach; especially is this true of the Epsom salts. The purgative action is due chiefly to increase of the intestinal secretions, and hence the stools are large and watery. Thiry and Radziejewski had apparently demonstrated that all purgatives acted by increasing the peristaltic movements, but exactly opposite results have been obtained by Moreau, whose observations have been confirmed by Vulpian and Brunton. The conclusion reached by the last-named observer is expressed as follows: "Such positive results as these seem to prove that purgatives do cause a flow from the intestinal wall, quite as conclusively as experiments with Thiry's fistula do the opposite; and, as the conditions under which the purgatives act on the intestines more nearly approach the normal in Moreau's than in Thiry's experiments, there can be little doubt that purgatives produce a decided secretion of fluid from the intestines, as well as accelerate peristaltic movements." Of the agents employed by Brunton in his experiments—croton-oil, elaterin, gamboge, jalapin, and sulphate of magnesia—the greatest secretion was caused by the latter. The results of the best directed experiments are, therefore, in

accord with clinical observations, and it may hence be considered as established that saline cathartics produce an outpouring of fluid into the intestinal canal. This outward osmosis occurs chiefly from the vessels, and is not truly a secretion of the glandular appendages of the mucous membrane.

THERAPY.—The saline purgatives are indicated in *acute inflammatory affections*, as a part of the denutrition treatment. If the arterial tension is abnormally high, purgatives, especially the salines, lower it, as the sphygmographic tracings show. When a considerable quantity of serum is withdrawn from the intestinal vessels, the blood-pressure is necessarily diminished elsewhere (Brunton). Free transudation from the blood-vessels of the intestinal canal lessens the amount of work which the kidneys have to do, and, if these organs are hyperæmic, removes the congestion. Saline cathartics are therefore very important remedies in the treatment of *renal and cardiac dropsy*. Free purgation, also, influences the condition of the kidneys by reflex action. As a result of the lessened hyperæmia of the kidneys, the diminution of the blood-pressure, and the reflex stimulation of these organs, the action of a purgative is often followed by greatly-increased activity of the renal function. In *ascites* from obstruction of the portal circulation, saline cathartics are even more conspicuously beneficial than in general dropsy—for in this case they affect directly the organs involved. *Cholæmia, uræmia, œdema of the brain, increased intracranial blood-pressure* from any cause, are conditions requiring the use of active saline cathartics.

The most important applications of saline cathartics are in the treatment of various intestinal disorders. When the stomach is irritable, and the intestines inflamed, no other purgative is so well borne as Epsom salts, and its use may be resorted to when any other agent of the kind would be inadmissible. *Impaction of the cæcum*, and *typhlitis* resulting from this cause, may be removed by the proper administration of this remedy. It is unsafe, by active and drastic purgatives, to attempt to unload the bowel—for these harsh measures will only aggravate the existing inflammation. Epsom salts will liquefy the fecal masses and deplete the vessels, and thus remove the obstruction without causing any irritation. Small doses frequently repeated are more suitable than a large purgative dose. Usually about a teaspoonful in a wineglassful of water, every three hours, will be the quantity required. Perityphlitis and the peritonitis arising from inflammation and perforation of the *appendix vermiformis* are conditions in which purgatives of any kind are inadmissible.

The constipation which accompanies *lead-colic* can be overcome by Epsom salts. ℞ Magnesii sulphatis, ℥ j ; acidi sulphuric. dil., ʒ j ; aquæ, ℥ iv. M. Sig.: *A tablespoonful every three hours.* As Brunton has pointed out, the administration of Epsom salts is a very important

expedient in the treatment of the *saturnine cachexia.* Lead, as well as other minerals, mercury and copper, for example, is eliminated with the bile, and is discharged into the intestine, where it is again absorbed. For an indefinite period, therefore, the absorption and discharge of the same metal may be going on ; and hence the utility of giving purgative doses of Epsom salts during the treatment of lead-poisoning.

The most efficient treatment of *acute dysentery* is by the administration of sulphate of magnesia. It is especially adapted to the acute stage when there are fever, pain, tenesmus, and stools of mucus and blood. It lessens the hyperæmia and causes fecal evacuations, with the result of relieving the pain and the distressing straining. It is administered as follows : Take a sufficient quantity of sulphate of magnesia to saturate eight ounces of water, and to this saturated solution add one half ounce of diluted sulphuric acid. The dose of this is a tablespoonful every hour or two, in a wineglassful of water, until it operates. Sulphate of morphine may be combined with it, or starch enemata with laudanum may be employed.

The *bleeding from hæmorrhoids* may sometimes be arrested by the above-described solution of Epsom salts and sulphuric acid, especially if the state of the hæmorrhoidal vessels be due to constipation. *Uterine hæmorrhage* caused by the presence of a fibroid, or by *subinvolution*, and *congestion of the pelvic viscera*, are not unfrequently relieved by the same agent when other agents apparently more powerful fail. When congestion of the pelvic organs, constipation, and anæmia coexist, the following is an efficient remedy : ℞ Magnesii sulphat., ℥ j ; ferri sulphat., manganesii sulphat., āā ℈ j ; acid. sulphur. dil., ʒ ij ; aquæ, ℥ iv. M. Sig. : *A tablespoonful in a wineglassful of water each morning before breakfast.* For *habitual constipation* in those of full habit and active circulation, a daily morning dose of a teaspoonful of Epsom salts is often a permanently effective remedy.

The disagreeable taste of Epsom salts is perfectly well covered by coffee. Boil for two minutes in an earthen vessel one ounce of sulphate of magnesia and two and a half drachms of roasted coffee in a pint of water ; then remove from the fire, allow it to "draw" for a few minutes, and strain.

The other saline purgatives belonging to this group are :

Sodii Sulphas, sulphate of sodium, Glauber's salts,

Potassii Sulphas, sulphate of potassium ; but both of these have long since ceased to be used.

Sodii Phosphas, phosphate of soda,

Potassii et Sodii Tartras, tartrate of potassium and sodium, Rochelle salts, and

Pulvis Effervescens Compositus, effervescing aperient powders or Seidlitz powders, have been considered elsewhere.

Potassii Bitartras, bitartrate of potassium, cremor tartar, may also be regarded as a member of this group, although it has but feeble purgative property.

Mercurial Purgatives.—As the actions and uses of the mercurial preparations have been sufficiently discussed elsewhere, little need be said in addition as respects their applications as purgatives.

Hydrargyri Chloridum Mite.—Mild chloride of mercury. Calomel. Dose as a cathartic, gr. j—grs. x.

Massa Hydrargyri.—Mercurial pill. Blue mass. Dose, grs. v—grs. xv, as a cathartic.

Actions and Uses.—These mercurial purgatives are rather slow in their action. A dose at bedtime will usually operate during the course of the following morning. One grain of calomel or five grains of mercurial pill will produce distinct purgative effects in most persons in about twelve hours, unless there be considerable habitual torpor of the bowels. They are apt to cause griping pains, nausea, and even vomiting, when the purgative effects begin. First brownish and bad-smelling, and afterward greenish stools, supposed formerly to be characteristic of the mercurial action, are produced. Much heated discussion has arisen as to the cholagogue action of mercury. Without entering into details on this point, it may be admitted that bile-elements are found in the stools from the action of mercury, as they are unquestionably found in the stools caused by some other purgatives. The presence of bile-elements in the fæces discharged, only proves that mercurial cathartics swept them out with the other contents of the intestinal canal, and does not prove that an excitant action was exerted on the secretory function of the liver. The stored-up bile in the gall-bladder may be emptied into the intestine in obedience to a reflex influence transmitted from the intestinal mucous membrane irritated by the purgative. Experimental investigations must be invoked to determine the question whether mercurials actually stimulate the liver to the production of an increased quantity of bile. In another place the experiments of Hughes Bennett's Edinburgh Committee have been stated. Since the report of that committee has made its appearance, the very accurate and painstaking investigations of Rutherford and Vignal have been published. Röhrig had already determined as the result of his experiments that "with large doses (twenty grains for a dog) it rarely happened that the secretion of bile was recalled after it had come to a standstill, although this agent can increase the secretion when it is only diminishing." Rutherford and Vignal arrived at the following conclusions as the results of their experiments with calomel: "1. An increase of the biliary secretion followed the administration of two successive doses of ten grains of calomel in one case (Experiments 30). Diminution of the secretion was the only result of the same doses given under similar circumstances in other two cases (Experiments 31 and 32); and it was the most definite result of the administration of four successive doses of three grains in another case (Experiment 33). 2. In all the four experiments the calomel had a purgative effect. 3. Analysis of the bile secreted during the calomel purgation in Experiment 33 showed that, notwithstanding a diminution in the quantity of bile secreted, the percentage amount of solids had become less." The results of experiment render it probable that mercurials do not increase the secretion of bile in animals, but we are not without confirmatory evidence in the human subject. In the cases of biliary fistulæ (accidental) observed by Westphalen and Ranke, no increase, but rather a diminution in the amount of bile, followed the exhibition of calomel in purgative doses.

That the purgative action of mercurials has a distinctive and peculiar quality, a vast clinical experience attests. The stools are rather different from those caused by other purgatives, and the therapeutical effects are, it is generally held, *sui generis*. Whatever peculiarity pertains to the purgative action of mercurials is probably due to the fact that they greatly increase the elimination of the products of waste, or retrograde metamorphosis of tissue, by the intestinal glandular apparatus.

As a purgative, the use of mercury is restricted to those cases in which a deficiency of bile is supposed to be the cause of the morbid state—*clay-colored stools, jaundice from catarrh of the gall-ducts;* and to those cases, singularly enough, in which bile is supposed to be in excess—*biliousness*, so called, jaundice from excessive production of bile, etc. For further remarks on the actions and uses of mercury the reader is referred to the section on remedies used to promote destructive metamorphosis.

TONIC-ASTRINGENT AND RESIN-BEARING PURGATIVES.

Senna.—Senna. The leaflets of *Cassia acutifolia* Delile (Alexandria senna), and of *Cassia elongata* Lémaire-Lisancourt (India senna), (Nat. Ord. *Leguminosæ, Cæsalpinaceæ*). (U. S. P.) *Feuilles de séné*, Fr.; *Sennesblätter*, Ger.

Confectio Sennæ.—Confection of senna. (Senna, coriander-seed, licorice, figs, prunes, tamarinds, cassia.) Dose, ʒ j—ʒ ij.

Extractum Sennæ Fluidum.—Fluid extract of senna. Dose, ℥ ss.

Infusum Sennæ Compositum.—Infusion of senna. (Senna, ℥ j; coriander-seed, ʒ j; boiling water, Oj.) Dose, ℥ iv.

Syrupus Sennæ.—Sirup of senna. Dose, ʒ ss—ʒ ij.

Composition.—The active constituents of senna prove to be a peculiar colloid body, and an acid, to which has been given the name