that is extravagant has been written in regard to its curative influence in *pneumonia*, but we need not be surprised at this, when we reflect that our knowledge of the natural history of this disease is only of recent origin. Those who knew nothing of the period of crisis of pneumonia naturally attributed the defervescence of temperature to the effect of the remedy. It is not to be denied that in the very incipiency of pneumonia, before fibrinous exudation has taken place, veratrum viride, by lessening the amount of blood circulating in the lungs, may render an important service, but when hepatization occurs its good effects cease. The same observations are true of other parenchymatous inflammations, and equally so of serous inflammations.

Veratrum viride has been much extolled as a remedy for reducing the pulse-rate and the temperature in *typhoid and other fevers* (Norwood). It is true, these effects may be procured by it, but that any influence is exerted in this way, over the course and duration of a fever, seems highly improbable. The chief dangers in fever being the occurrence of cerebral or cardiac paralysis due to the persistent elevation of the temperature, it is unwise to use a powerful cardiac depressant, although it has the power to lower the temperature somewhat. There is, however, a condition of things arising in the course of fevers —viz., *delirium ferox*—in which, when dependent on arterial excitement, much good may be accomplished by the use of veratrum viride.

The excitement of *acute mania*, of *maniacal delirium*, and other forms of mental disorder in which a condition of cerebral hyperæmia may be supposed to exist, is successfully combated by veratrum viride. In a private communication, Dr. Sullivan, of San Francisco, informs me that this agent (ʒ ss of the fluid extract every fifteen minutes until nausea or vomiting ensues) is "*invaluable in puerperal convulsions.*" Barker, in his "Puerperal Diseases," had already called attention to its utility, and Boyd confirms the previous observations. It well deserves trial in this malady and in analogous states.

Veratrine is used only externally, and for the relief of *neuralgia, headache, myalgia*, etc. The official *unguentum veratriæ* is the form in which it is employed—a small quantity being rubbed in over the seat of pain.

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Boyd, Dr. *American Practitioner*, January, 1878.

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Pulsatilla.—Pasque-flower. The herb of *Anemone pulsatilla* and *Anemone pratensis* Linné, and of *Anemone patens* Linné, var. *Nuttalliana* Gray (Nat. Ord. *Ranunculaceæ*), collected soon after flowering. (U. S. P.) *Pulsatille*, Fr. ; *Küchenschelle*, Ger.

Preparations.—There are no official preparations. The tincture is the form usually employed in medical practice, the dose of which varies from one minim to twenty minims.

Composition.—The peculiar powers of the plant depend on the presence in it of an alkaloid—*anemonine*, a camphor. Anemonine crystallizes in prisms—the regular rhombic system—and is hardly at all soluble in cold water and in alcohol (Husemann). Pulsatilla also contains a peculiar acid—anemonic acid.

Antagonists and Incompatibles.—The caustic alkalies, tannic acid, and the metallic salts generally, are chemically incompatible. From the physiological standpoint, pulsatilla is antagonized by the alcohols, by opium, digitalis, etc.

Synergists.—The effects of pulsatilla are promoted by the paralyzers, especially by the other members of the same family—notably, by aconite, veratrum viride, etc.

Physiological Actions.—The local effects of pulsatilla (the fresh plant) are those of an irritant ; and, after prolonged contact, even caustic effects are produced. Applied to the tongue, it gives rise to tingling, burning, followed by numbness—effects very similar to those caused by aconite. On the intestinal mucous membrane it has very pronounced irritating effects. The active principles diffuse into the blood with facility. Depression of the heart's action, lowering of the arterial tension, and declination of temperature, are caused by pulsatilla. It is a paralyzer of motility and sensibility, but, as respects the motor functions, it is not known whether it impairs the contractility of muscle or the irritability of nerve ; and, as respects sensation, it has not yet been determined whether the lessened sensibility is due to an influence which this remedy has on the spinal cord, on the nerve-trunks, or on the peripheral expansion—end-organs of the sensory system. Dilated pupils, hebetude of mind, stupor, coma, and convulsions, are cerebral symptoms which occur after a lethal dose has been administered. These cerebral effects may be due to a primary action of pulsatilla on the brain, or to the carbonic-acid poisoning and the anæmia. When the action of the heart and the respiration are very feeble,

carbonic acid accumulates in the blood, and an extreme degree of cerebral anæmia ensues. Coma, convulsions, and insensibility, are natural effects of these causes. Nothing is positively known as to the time and mode of elimination of anemonine, but it is probable that excretion takes place by the kidneys.

The production of any given physiological effect will, of course, depend on the genuineness of the drug. The active principles are volatile, and often disappear in the process of desiccation.

Therapy.—Owing to the irritating action of pulsatilla, it is not suited to the treatment of gastro-intestinal disorders, especially when a state of inflammation exists. Notwithstanding this local irritant effect, homœopathists employ it for the relief of dyspepsia and the accompanying mental symptoms ; but, in coming to conclusions as to its curative value, they calmly ignore the natural history of these maladies.

Pulsatilla is adapted to the treatment of *acute inflammation of the nasal, faucial, laryngeal, and bronchial mucous membrane*—acute catarrh. It is not proper in those cases when accompanied by gastro-intestinal disturbance. It is clearly useful in *acute inflammation of the cerebral and spinal meninges.*

It is used by the homœopathists in the treatment of catarrhal ophthalmia, by internal and local applications ; and they hold that it is very efficacious in certain diseases of the uterus, on which organ they suppose it to have a special or specific action. *Sudden arrest of the menstrual flow*, whether caused by moral emotion or by cold, may be relieved, and the effects prevented, by pulsatilla. As aconite is very useful under the same circumstances, it may be assumed that good results may be had by the administration of pulsatilla.

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Gubler, Prof. A. *Codex Medicamentarius*, p. 17.
Husemann, Drs. Aug. und Theod. *Die Pflanzenstoffe*, p. 795.
Phillips, Dr. Charles D. F. *Materia Medica and Therapeutics*, p. 17.

Grindelia.—The leaves, stems, and flowers of *Grindelia robusta* Nuttall (Nat. Ord. *Compositæ*). (U. S. P.)

Preparations.—*Extractum Grindeliæ Fluidum.*—Fluid extract of grindelia. Dose, ♏ x—℥ j.

Extractum Grindeliæ.—Extract of grindelia. (Not official.) Dose, gr. j—gr. v.

Composition.—An alkaloid with basic properties has been isolated (Rademaker), but its chemical relations have not been fully made out. The plant contains also a volatile oil, and a resin, to which its physiological activity is doubtless in part due.

Antagonists and Incompatibles.—Water precipitates the oleo-resin. The mineral salts and caustic alkalies are chemically incompatible. Opium, the cerebral stimulants, alcohol, strychnine, picrotoxin, etc., are opposed as respects the physiological actions.

Synergists.—All motor depressants increase the actions of grindelia.

Physiological Actions.—The taste of grindelia is rather pungent, even acrid, and in the stomach it excites a sensation of warmth. The local stimulant effect is such that it promotes the appetite and digestion ; but, if too long continued, or in too great quantity, it excites gastric uneasiness. Grindelia slows, somewhat, the heart and respiratory movements. When administered in sufficient quantity, decided cerebral effects are produced. It dilates the pupil and induces sleep. During this condition of hypnotism, the general cutaneous sensibility is much reduced, and reflex movements become sluggish. Motility is also affected, the paresis beginning in the hind extremities. Its toxic powers are by no means great, two drachms of the fluid extract being required to induce sleep in small rabbits. It affects other warm-blooded animals, and also frogs, in the same way. When death ensues, it is from paralysis of the muscles of respiration. Elimination takes place by the pulmonary mucous membrane, and chiefly by the kidneys.

Therapy.—The most important uses of grindelia, thus far developed, are in the treatment of the *respiratory neuroses.* Its utility in the treatment of *asthma*, especially the so-called *spasmodic asthma*, is certainly great ; few cases fail to be relieved at once. Besides the stomach administration, it may be given in the form of fumes, according to the following plan : The plant is steeped in a saturated solution of nitre, dried, when it may be ignited on an ordinary tin plate, the patient inhaling the fumes as they arise, or the fumes in the air of a small, closed apartment. This preparation may also be rolled into cigarettes, and smoked with or without the addition of tobacco, stramonium, lobelia, etc. The fluid extract of grindelia may be incorporated with other asthmatic remedies, in an extemporaneous prescription. For example : ℞ Ext. grindeliæ fluid., ℥ ss ; ext. lobeliæ fl., ʒ ij ; ext. belladonnæ fl., ʒ j ; potassii iodidi, ʒ iij ; glycerini, ℥ iij. M. Sig. : *A teaspoonful, as necessary.*

Cough by imitation and habit, whooping-cough, and the *spasmodic difficulty of breathing* which accompanies various pulmonary and cardiac diseases, *hay-asthma*, etc., are helped by grindelia. It is also an effective remedy for *bronchitis*, after the subsidence of acute symptoms ; for *chronic bronchitis* and *bronchorrhœa*, and for the bronchitis of *emphysema.*

Besides the above diseases for which grindelia has been used with success, it will prove advantageous in *chronic pyelitis*, *chronic cystitis*, etc. In these diseases local application of the oleo-resin takes place all along the urinary tract.

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Crowe, Dr. John E. *Louisville Medical News*, April, 1876.
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Phytolacca.—*Phytolaccæ bacca.*—The fruit of *Phytolacca decandra* Linné (Nat. Ord. *Phytolaccaceæ*). (U. S. P.) Poke-berries.

Phytolaccæ radix.—The root of *Phytolacca decandra*—poke-root.

Preparations.—*Extractum Phytolaccæ Fluidum.*—Fluid extract of phytolacca. Dose, ♏ v—3 j. (Not official.)

Tinctura Phytolaccæ.—Tincture of phytolacca. Dose, ♏ x—3 j. (Not official.)

Composition.—Claussen has obtained a neutral principle, which he has named *phytolaccin*, but this should not be confounded with an impure resin called by the eclectics "phytolaccin." Claussen's *phytolaccin* occurs in silky, shining crystals, soluble in alcohol and ether, but not in water. A peculiar acid, *phytolaccic acid*, has also been found in the berries by Terail. It is uncrystallizable, but soluble in water and in alcohol.

Antagonists and Incompatibles.—Alcohol, ether, opium, digitalis, etc., oppose the action of phytolacca.

Synergists.—All depressing agents, the paralyzers, and emetics, contribute to the effects of phytolacca.

Physiological Actions.—Poke is nauseant and emetic, and these effects occur, whatever may be the mode of administration. The emesis does not occur at once ; there is a slowly-accumulating anguish ; vomiting does not result for an hour, and the vomiting is accompanied with great depression. Rutherford has shown that the eclectic preparation *phytolaccin* has decided cholagogue property—ranking, indeed, among the most effective of the agents influencing the flow of bile.

Phytolacca lowers the rate of cardiac movement and the respiration, but does not alter the rhythm. It is a paralyzer, the loss of power occurring first in the hind extremities. The impairment of motility is not due to an action of this agent on the motor nerve or on the muscle —for the irritability of the nerve and the contractility of muscle remain unaffected when a lethal dose of phytolacca has been given. The action is on the spinal cord, chiefly on the medulla. In rabbits, violent trembling occurs, and convulsions, partly tonic, partly clonic, are produced. Death ensues from paralysis of respiration ; for in frogs, when all signs of life have ceased, the heart is found to be in action, on opening the chest. In cases of accidental poisoning, convulsions of a tetanic character have been observed. Elimination takes place chiefly by the kidneys.

Therapy.—Poke has been proposed as an emetic, but the slowness of the action, and the great depression of the powers of life which it

causes, have prevented, and will ever prevent, its employment for this purpose.

Alterative powers have been ascribed to it, and cases supposed to be malignant have been cured ; but these results were probably instances of the *post* rather than the *propter hoc.* Ulcers, cutaneous diseases, and ophthalmia, are maladies which have been reported cured. Fenner reported a case of *granular conjunctivitis* cured by it, and in the same issue of the journal there is an editorial note, affirming the remarkable powers of the remedy in this disease. If it really does cure this disease when given by the stomach, poke is a remedy of extraordinary value. The evidence is strong that phytolacca does possess considerable power to promote the healing of varicose and other *ulcers of the leg* (Tidd). A soft extract is spread on muslin, and kept applied to the surface of the ulcer. Obstinate *eczema* has been cured in the same way. The pain and inflammation of *burns* may be assuaged by the same application, and the healing greatly facilitated. How far the effect is merely mechanical does not appear.

It has long been known that phytolacca is a serviceable remedy in *chronic rheumatism.* But the therapeutical application of this remedy most deserving of consideration is the treatment of *inflamed breasts.* There seems to be no reason to doubt that phytolacca possesses the remarkable property of arresting an inflammation of the mamma, and preventing suppuration. For this purpose the fluid extract may be given internally, and the solid extract spread on a cloth and kept applied to the breast which is the seat of the inflammation. The possession of this property to prevent suppuration in the breast implies the existence of the same property in threatened suppuration in other glandular organs. As the fact is entirely empirical, and rests on no physiological action of the drug, it can only be determined by further trials whether it will check suppuration elsewhere.

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Dutcher, Dr. A. P. *The Cincinnati Lancet and Observer*, June, 1859.
Tidd, Dr. C. H. *The Clinic*, vol. v, p. 253.

Ailanthus.—The bark of *A. glandulosa*, a well-known and abundant shade-tree. (Unofficial.)

Preparations.—Fluid extract. Dose, ♏ x to 3 j. Bark, gr. x—3 j.

Composition.—The most important constituent is the oleo-resin. It contains, also, a volatile oil, which is extremely diffusible and powerful, and a bitter principle.

Actions and Uses.—The taste is bitter and somewhat acrid. It is strongly nauseant, and the nausea is accompanied with weakness, vertigo, and cold sweating. It possesses decided purgative property, the

stools being large and watery. It has considerable power as a vermifuge, and is effective when employed against tænia. The action of the heart is at first increased, but is subsequently slowed, the pulse becoming small and weak. Respiration is similarly affected, and death ensues in animals by paralysis of the muscles of respiration.

On the brain and nervous system ailanthus acts as a paralyzer, the loss of power beginning in the hind extremities. The paralyzing action seems to depend on the volatile oil, while the purgative and anthelmintic effects are possessed by the oleo-resin.

THERAPY.—The most important application of ailanthus is in the treatment of *tape-worm*. For this purpose the oleo-resin, or, better, a decoction of the fresh bark (℥ j—℥ iv), may be used. The oleo-resin has the advantage in being a permanent preparation, whereas the bark loses its strength in the process of drying.

Muscarine.—The alkaloid of *Amanita muscaria*, the fly-fungus.

PROPERTIES.—Muscarine is an alkaloid with strong basic properties, and combines with acids to form salts. It has the consistence of sirup, is without odor, free from taste, and is readily soluble in water and in alcohol, but is insoluble in ether and in chloroform. Besides being obtained from the fungus, it has been constructed synthetically, the product having the same actions, it is alleged ; but this statement seems doubtful, especially in view of the rather negative results reached by Ringer, with a specimen furnished by Merck, of Darmstadt.

As muscarine is but slightly irritating to the tissues, it may be used subcutaneously. The dose ranges from one eighth of a grain to two grains. According to Ringer, one third of a grain is the minimum quantity to produce symptoms in men, administered hypodermatically, but in this statement he referred to Merck's alkaloid prepared synthetically.

ANTAGONISTS.—The actions of muscarine are antagonized by atropine (Schmiedeberg and Koppe), by digitaline (Böhm), and by eserine (Prevost). By atropine it is antagonized at all points. When the heart is arrested by muscarine, it possesses the capability of again renewing its action under the influence of a large number of agents, but atropine possesses this property in the highest degree (Alison). Muscarine arrests the heart in diastole by stimulating the intracardiac inhibition apparatus—atropine paralyzes this apparatus (Prevost) ; muscarine causes intense dyspnœa by inducing strong contraction of the pulmonary arteries—atropine relaxes this spasm, unloads the right cavities of the heart, and respiration is resumed ; muscarine lowers, atropine raises the blood-pressure ; muscarine tetanizes the muscular layer of the intestine—atropine induces a paresis of the same ; muscarine increases the secretions of liver, pancreas, and intestinal mucous membrane—atropine arrests these secretions ; muscarine stops the renal

secretion—atropine restores it ; muscarine causes sweating, salivation, and lachrymation—atropine dries them all ; muscarine contracts the pupil—atropine dilates the pupil. For the quantity producing a given physiological effect, the power of the two agents is very unequal, atropine being much stronger. An atropinized eye dilated to a certain point will not be contracted by the quantity of muscarine sufficient when unopposed to induce a marked degree of myosis ; but a much larger quantity may overcome the atropine. The same fact is true throughout the whole range of their antagonistic action.

In frogs poisoned by digitaline, the cardiac movements recommence and are maintained for hours by the application of a solution of muscarine. The same fact is true of tobacco and physostigma : the heart arrested by these agents recommences movements when muscarine is applied, and *vice versa*.

SYNERGISTS.—The motor depressants synergize some of the actions of muscarine. A close correspondence exists between pilocarpine and muscarine. They both cause nausea, diarrhœa ; muscarine at first quickens then slows, and pilocarpine quickens the pulse ; they both flush the face and produce free perspiration and salivation ; they both cause frontal headache ; both contract the pupil ; and both diminish the urinary secretion. They differ in some respects, but chiefly in the extent of their action, or quantitatively. Pilocarpine causes more perspiration and salivation ; muscarine produces decidedly more active intestinal movements. Pilocarpine diminishes the urinary secretion, but muscarine may arrest it entirely. Pilocarpine slightly contracts the pupil ; muscarine contracts the pupil more decidedly, but when applied to the eye directly, dilates the pupil. Pilocarpine always quickens the pulse, muscarine slows the pulse.

PHYSIOLOGICAL ACTIONS.—The salivary secretion in a large proportion of subjects is much increased. A feeling of constriction of the neck, nausea, and vomiting, and more or less abdominal pain, are produced by it, whether administered by the stomach or subcutaneously (Brunton). The pancreatic and biliary secretions are notably increased after the injection of some milligrammes into a vein (Prevost). This increase of these secretions took place as well between as during digestion. The intestinal mucus is also greater in quantity than normal, and it may be streaked with blood (Schiff). The intestines are thrown into active contractions, tetanized, rather than merely stimulated into more frequent vermicular movements. Under ordinary medicinal doses in man, the bowels are relaxed and the character of the evacuations altered, doubtless, because of the much greater quantity of the biliary and pancreatic secretions poured out. The increased movement of the intestines is accompanied by considerable colic-like pain.

Muscarine enters the blood promptly, whether introduced through

the stomach or subcutaneously. It is a cardiac poison. A very minute quantity—a mere trace—applied to the frog's heart, arrests its movements. As Schmiedeberg and Koppe first demonstrated, it arrests the heart in the diastole, and does not impair the irritability of the heart-muscle, for, on irritation of the heart by mechanical, chemical, or electrical means, it again contracts. If the dose is short of lethal, the heart is merely slowed, the number of pulsations being reduced ten, twenty, or even forty beats per minute. Section of the vagi does not affect this result. The action is due to stimulation of the intracardiac inhibitory apparatus. By Alison it is referred to over-excitation of the cardiac terminals of the vagus, and coincident diminution in the activity of the sympathetic fibers. When the effects of muscarine are manifested by a diminution of the pulse-rate, the blood-pressure begins to decline. At first the vessels contract, but this is soon succeeded by dilatation (Bogosslowsky). With the slowing of the heart and dilatation of the vessels, the blood accumulates in the periphery, and the blood-pressure is consequently reduced one half.

Disturbances of respiration occur with the other defined symptoms. The breathing grows more labored with the increasing effects of the agent, and presently an intense dyspnœa supervenes (Schmiedeberg). The mechanism of the labored respiration is obvious enough. Such a strong contraction of the pulmonary vessels ensues as to greatly diminish the quantity of blood circulating in the lungs, with the result of over-distention of the right cavities of the heart. Hence it follows that the state of the blood is impaired by the lack of oxygen and the retention of carbonic acid, and to these factors must be attributed in part the cyanosis and asphyxia. These modifications of the respiration occur after preliminary section of the vagi. The almost arrested oxygenation of the blood, the languid circulation, and the profuse perspiration, are the factors which cause a lowering of the temperature. By Schmiedeberg and Koppe there are recognized three conditions of the body-heat: 1. A slight elevation, which is by no means constant, and very transient, coming on in about two hours after the dose—a small one—has been taken; 2. A depression of one or two degrees, succeeded presently by the normal temperature, produced by a full medicinal dose; and, 3. A very pronounced lowering of the temperature from a fatal dose.

By the internal administration of muscarine the pupil contracts, and, singularly enough, by direct application, dilates. There are other examples of this paradox. Vision is disturbed by alteration of the accommodation apparatus by spasm. The myosis depends on stimulation of the circular fibers of the iris or of the third nerve, and not on paralysis of the radiating fibers, or of the sympathetic filaments.

Muscarine produces abundant perspiration, and, indeed, stimulates this function only less powerfully than pilocarpine. In most cases the saliva is correspondingly increased. The two functions do not always act together with the maximum energy, and one may be powerfully affected, while the other is quiescent. Lachrymation is nearly constant, and the nasal mucus is more abundant than in the normal state. Thus, while all other secretions and excretions are increased by muscarine, it is remarkable that the urine should be decidedly lessened in amount, even suppressed. In eight experiments made with great care, Prevost found that the injection of muscarine into a vein diminished the urinary secretion, and, indeed, almost stopped it when the dose was large. The elimination of muscarine takes place by the kidneys. The best evidence that it is excreted unchanged is the physiological action of the urine. The urinary secretion of an animal poisoned by muscarine will poison another animal to whom it is administered, and its powers are transmitted with little diminution through several.

THERAPY.—The applications of muscarine to the treatment of disease are yet in their infancy. The physiological effects indicate the direction of the remedial applications. As muscarine stimulates so powerfully the muscular fiber of the intestine, and the secretions of the pancreas, liver, and intestinal mucous membrane, it ought to be very serviceable in cases of constipation with torpor of the organs concerned in digestion. When *constipation* is due to paresis of the muscular layer of the bowel and to deficient secretion, this remedy will probably relieve it. In the treatment of intestinal torpor and deficient secretion, muscarine may be combined with other remedies, as atropine and strychnine, which act on the organs concerned, or with cathartics and cholagogues: ℞ Muscarinæ, gr. iv; ext. belladonnæ, ext. nucis vomicæ, āā gr. iij; euonymin, ʒ ss. M. Ft. pil. no. xij. Sig.: One pill morning and evening. When the digestion of the starches and fats is imperfect, it is strongly indicated. In *catarrh of the duodenum*, and in *catarrhal jaundice*, it ought to be very efficient. In these maladies, the remedy should be administered frequently and in small doses: ℞ Muscarinæ, gr. j; aquæ, ℥ j. M. Sig.: A teaspoonful every three hours. It is probable, also, that it will prove useful in *recent hæmorrhoids* due to congestion of the portal circulation. It promises well as a remedy for the removal of *inflammatory effusions and exudations*. It ought to afford prompt relief at the onset of a *common cold*, an *acute bronchitis*, *hay-asthma*, etc. As muscarine produces strong contraction of the pulmonary capillaries, it ought to be useful in *pulmonary hæmorrhage*, in incipient *congestion of the lungs*, etc. Under such circumstances the combination with digitalis ought to be especially effective, for, while digitalis will aid the curative action on the pulmonary vessels, it will, at the same time, antagonize the cardiac depression caused by muscarine. It is contraindicated in affections of the air-passages when secretion is in excess. For the *night-sweats of phthisis* fly-fungus has long been used, and a similar

fungus is commended by Trousseau ; but it has not been as successful in the hands of Murrell as some other agents, although capable, sometimes, of very good results. Muscarine is of doubtful propriety, if not positively contraindicated, in renal affections characterized by deficiency in the excretion. On the other hand, it ought to be of signal service in *diabetes insipidus* and in saccharine diabetes. It has been used successfully to arrest the secretion of milk.

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Schiff, Prof. *Lo Sperimentale*, abstracted in the *London Medical Record*, vol. iv, 1876, p. 339.

Schmiedeberg und Koppe. *Das Muscarin, das giftige Alkaloid des Fliegenpilzes*, etc. Leipsic, 1869. Vogel.

Quebracho.—The bark of *Aspidosperma quebracho*, an apocynaceous tree of Chili.

Preparations.—*Tincture.*—One part of quebracho to five parts of alcohol. Dose, ♏ v—3 j.

Wine.—One part of quebracho, two parts of alcohol, and sixteen parts of white wine. Dose, a teaspoonful to a tablespoonful. A fluid extract, prepared according to the general directions of the Pharmacopœia, will probably be found an eligible preparation.

Composition.—Quebracho seems peculiarly rich in alkaloids, but it is doubtful whether any one represents in its entirety the physiological powers of the bark itself. The most important are *aspidospermine*, discovered by Fraude in 1878, and *quebrachine*, separated by Hesse in the following year. Hesse describes several other active constituents or alkaloids, but the two just mentioned are the most important.

Adulterations. — Soon after the first specimens were sent to Europe, the sudden demand which sprang up induced sophistication, and quebracho-wood and quebracho colorado were substituted for the genuine. This substitution proved the less important, since these preparations acted in a similar manner, and were only weaker (Penzoldt). The early physiological investigations must, therefore, be interpreted by the light of this difference in the action of the several substances comprehended in the term *quebracho.*

Physiological Actions.—Quebracho has the stomachal effects of the bitters in general : it promotes appetite and increases the digestive powers. The alkaloids diffuse promptly into the blood. The action of the heart is lowered ; the pulse in the normal state is less frequent ; at first, the tone of the artery is higher and the blood-pressure is raised, but as the action is continued, especially from lethal doses in animals, the force of the circulation declines and the pressure falls. The respiration is also slowed, and the sense of need of air is less imperative. The hurry of circulation and of respiration, and the feeling of oppression induced by active exercise, are modified by quebracho. Picot-Berthold studied these actions on his own person. Ascertaining first the rate of increase of the respiratory movements and of the circulation induced by active exercise of a definite amount, he next determined the influence of the remedy on these functions when the same amount of exercise had been taken. While without quebracho his pulse and respiration rose respectively to 42 and 94, under the action of the medicament they were 30 and 80. Not only was the rate of movement lessened, but the accompanying distress for want of air was decidedly ameliorated.

Guttmann, who has made an elaborate study of aspidospermine, finds that in both cold- and warm-blooded animals it is an active poison of the respiratory and circulatory apparatus. In cold-blooded animals the respiratory actions are most pronounced, and death is produced by the effect of the poison on the respiratory center. Slowing of the heart's action proceeds *pari passu* with the diminution of the respiratory energy, and the cessation of the heart's movements is finally due to the impression of the poison on the intra-cardiac motor ganglia. In warm-blooded animals (cats) the influence of the poison on the heart is primary. The slowing of the pulse is not due to any effect which it has on the vagi, but to the paralyzing action which it exerts on the cardiac motor ganglia. With the slowing of the heart the temperature declines, and, with the diminution of respiration, dyspnœa comes on. Then the accumulation of carbonic acid in the blood induces stupor, and in animals convulsions. The reflex function is lowered in cold- but not in warm-blooded animals ; sensibility is unaffected in the latter, but motor paralysis finally occurs in both classes. Death is due to paralysis of the heart.

Therapy.—The applications of quebracho in the treatment of disease were originally empirical, but they are clearly deducible from its physiological actions. It has long been known as a fever-medicine and as a remedy for dyspnœa, in the province of Santiago, Chili, where it was first obtained by Dr. Schickendanz. It has been used as a stomachic tonic, like the bitters in general, but more especially like cinchona, to increase the appetite and digestion in *atonic dyspepsia.* It is, however, chiefly important as a remedy for *dyspnœa.*