morning, cloudy in the afternoon, and clearing and clear at night.

Wind.—The prevailing winds are remarkably constant from the east or between northeast and southeast. The velocity is steady and averages ten miles an hour. It is subject to a regular diurnal range, rising gradually to a maximum at the hottest part of the day and subsiding from that time to a minimum at the coolest part of the day, just about sunrise. This regularity and steadiness of the wind cannot be over-estimated in its relation to the comfortable habitability of Porto Rico.

Storms.—Though visited August 8th, 1899, by one of the most destructive storms of recent years, the island is well to the east of the usual tracks of West Indian hurricanes. Thunder storms, though of almost daily occurrence and accompanied by great electrical display, are not destructive, and one soon becomes used to their apparent violence.

History.—Porto Rico was discovered by Columbus in 1493. The first settlement was made by a party of Spaniards under the leadership of Ponce de Leon, at Caparra, A.D. 1510, but it was shortly afterward abandoned. San Juan was founded by the same leader in 1511. The town was sacked by the English under Drake in 1595, and again under the Earl of Cumberland in 1598. Since then it has successfully withstood the assaults of the Dutch in 1615, the English in 1678 and in 1797, and the United States in 1898. On July 25th, 1898, the island was invaded by the United States forces, who landed without opposition at Guanica on the southern coast. Only a feeble resistance was subsequently encountered. The Spanish formally evacuated the island October 18th, 1898. By the treaty of Paris, December 11th, 1898, Porto Rico was ceded to the United States. A census taken by direction of the War Department, 1899, gave a total population of 953,243 inhabitants. Unlike most, if not all, the other West Indian islands, Porto Rico has a larger white than black population. In 1899 there were 589,426 whites and 363,817 blacks. The density of population is also great, averaging 264 persons to the square mile, a density equal to that of New Jersey and twice that of Pennsylvania. The greater part of the population is rural. The population of the largest cities in 1899 was: San Juan 32,048, Ponce and its port 27,952, Mayaguez 15,187, and Arecibo 8,008. The ratio of illiteracy is high, but twenty-three per cent. of the population over ten years of age being able to read. Agriculture, such as it is, is the chief occupation, employing about sixty-three per cent. of the working population. The most important products are coffee, sugar, and tobacco. The total value of exports from July, 1898, to December, 1899, was $11,621,049. The imports during the same period amounted to $12,654,542. Transportation facilities before American occupation were poor. There existed but one hundred and thirty-seven miles of railroad, and with the exception of the excellent military road from San Juan to Ponce, and a few connecting branches, there were no common roads at all. Much has been done since to improve matters in this respect. The sanitary conditions were equally in keeping with the general indifference shown in other improvements. Few, very few, houses had any efficient sewage disposal systems. In many the systems were even worse than none, being in their ultimate workings actually pernicious. The average death rate, calculated from reported deaths for eleven years, is 30 per thousand. There is reason to think that this is considerably less than the actual. The chief causes appear to be: Anæmia, 22.50 per cent.; tuberculosis, 6.78; diarrhœal diseases, 3.83; cerebrospinal meningitis, 1.12; typhoid fever, 1.43; tetanus, 3.57. Smallpox was, prior to 1899, one of the chief causes of mortality, averaging annually 623 deaths. It is now, happily, no longer a factor of importance, owing to the thorough vaccination of the entire population carried out by the United States military authorities. Yellow-fever epidemics have occurred occasionally. The large mortality from anæmia appears to be due to the general infection of the drinking-water by the intestinal parasite, ankylostomum duodenale. Ordinary care exercised in filtering or otherwise purifying the water used for culinary and drinking purposes should be followed by a great reduction in this disease.

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POST-MORTEM EXAMINATIONS. See *Autopsies*, and *Neo-Born, Pathology of.*

POTASSIUM.—I. General Medicinal Properties of Compounds of Potassium.—In its physiological relations potassium is the most individual of the alkali metals, producing effects sufficiently pronounced to be seen characteristically in the case of all its compounds that are capable of absorption. Such effects are as follows: Locally, potassic compounds are irritant—less so than the average of soluble compounds of the heavy metals, but yet sufficiently so to make a large portion of a strong solution of a potassic salt dangerous on the score of irritation alone. In the intestines, potassic salts tend to increase the secretion of fluid, so that salts of this base that are of low diffusion power prove watery purges. Constitutionally, the prominent effects are certain derangements of function and certain effects that find their simplest explanation in the assumption that potassium quickens the rate of oxidation within the organism as it does in laboratory experiments. The derangements of function are, first, an enfeeblement of the heart's action, passing, in poisonous dosage, to permanent arrest in diastole. The effect seems to be due, as results of all experimentation agree, to a directly paralyzing influence upon the musculature of the organ itself. Secondly, but requiring relatively larger dosage, there follows general motor paralysis, voluntary and reflex. This effect is proportionately much more strongly marked in cold-blooded than in warm-blooded animals, and, in therapeutic dosage in man, is practically not seen at all. It is probably accomplished by an action on nerve centres, nerve trunks, and muscles conjointly, but an action which is most intense upon the nerve centres and least so upon the muscles.[1] The effects commonly assigned to a quickening of oxidation are, in the healthy, an increase in the solid excreta of the kidneys, with a proportionate increase in the volume of the urine, and, in the lithæmic individual, a diminution in the amount of uric acid excreted, with a simultaneous increase of urea and appearance of calcium oxalate. These effects in lithæmia are translated to mean an oxidation of much of the uric acid into oxaluric acid, which product then splits into urea and oxalic acid.[2] In large doses, long continued, potassic compounds prove noxious to nutrition, the blood becoming thin and unduly fluid, newly formed and lowly vitalized tissues, such as cheesy deposits, tending to liquefy, and health and strength generally to suffer. Therapeutically, the effects of applications of potassic compounds, determined by the potassium element of their composition, are to depress the heart in sthenic fever, to oppose the lithic diathesis, and to provoke catharsis or diuresis. Other uses are derived from individual peculiarities of the different compounds.

II. The Compounds of Potassium Used in Medicine.—The compounds of potassium official in the United States Pharmacopœia divide, for purposes of study, into two groups—the one embracing compounds whose effects are either derived from the potassium or are *sui generis* to the salt, and the other such as owe their effects mainly to the acid radical of their composition. The members of the former group, which alone will be discussed in this place, are the *hydroxide, carbonates* (normal and acid), *citrate, acetate, tartrates* (acid and potassio-sodic), *sulphate, nitrate,* and *chlorate.* The second category comprises the *hypophosphite, bromide, iodide, sulphide* (in the preparation, *potassa sulphurata*), acid *chromate, cyanide, ferrocyanide, permanganate, arsenite,* (in the preparation, *liquor potassii arsenitis*), *potassio-aluminum sulphate* (alum), and *potassio-ferric tartrate.* For discussion of these compounds see, severally, *Hypophosphites, Bromides, Iodides, Sulphides, Chromium, Cyanides, Ferrocyanides, Manganese, Arsenic, Aluminum,* and *Iron.*

Potassium Hydroxide (Potassium Hydrate): KOH. This is the compound which is both commonly and officially known as *Potassa*, Potassa, called also *caustic potash.* It is obtained first in aqueous solution by precipitating with lime a solution of acid potassium carbonate. Such aqueous solution, when rapidly boiled down, yields a fluid of oily consistence—simply the hydroxide melted by the heat—which, poured into cylindrical paper moulds, hardens on cooling into the cylindrical sticks in which form potassa is commonly met with. Potassa thus obtained is a white, hard substance, having a faint alkaline odor, and a very harsh, caustic taste. It is exceedingly deliquescent, and readily soluble in water and alcohol.

Beside the stick form, potassa is official in five per cent. aqueous solution under the title *Liquor Potassæ*, Solution of Potassa. This solution is made as just described, and is a clear, colorless liquid, odorless, but with the acrid, caustic taste of potassa. It should be kept in green glass bottles, glass stoppered, and the stoppers should be coated with vaseline or a thin layer of melted paraffin. Specific gravity about 1.036.

Potassa produces physiological effects which spring in part from an intense affinity for water, in part from its powerful alkalinity, and in part from its operation as a compound of potassium. Locally, in concentrated application, potassa is intensely caustic. A moistened stick swept even lightly over a tender surface produces speedy corrosion, which extends finally beyond the area of original application, the tissues breaking down widely into a brownish, slimy, pultaceous material. Taken internally, therefore, in strong solution, potassa is a corrosive poison. In such poisoning, the acrid, alkaline taste of the potion is followed immediately by severe pain in the pharynx, œsophagus, and epigastric region. These symptoms are in turn speedily succeeded by violent vomiting, where the ejecta have the greasy aspect and pultaceous consistency of tissues corroded by potassa, and prove strongly alkaline to test paper. The mucous membrane of the lips, mouth, and throat may be bright red from irritation, if the solution swallowed were not overstrong, or may, in the case of strong potions, show direct corrosion, being covered by a brownish film having a greasy or soapy feel. Loss of voice and extreme difficulty of swallowing are exceedingly common, but intestinal symptoms are generally wanting. Constitutionally, the symptoms are those of shock, from the suddenness and severity of the corrosion. In survival from serious grades of the poisoning, stricture of the œsophagus is a very common sequel. In the treatment, the only peculiar feature is to give harmless acids to neutralize the alkali, but since the damage is generally already fully done before the physician arrives, this chemical neutralization rarely avails for much. Vinegar or lemon juice are the acids most available, from their being strong but non-corrosive themselves, and at the same time readily procurable. Locally applied, in non-corrosive strength, potassa operates as a powerful and harsh alkali. Acids are neutralized, grease becomes saponified, epithelial tissues swell and soften, and acid secretions, such as the gastric juice and the sweat, tend to be called forth. Upon the skin, potassa lotions cleanse from dirt or the crusts of dried secretion and epithelium resulting from skin disease. Taken internally, the remedy excites appetite and increases the flow of the gastric digestive fluid, or in cases of fermentation of the food neutralizes acidity and so relieves the heartburn and nausea which such acidity excites. Constitutionally, medicinal doses of potassa produce, of course, the effects of all potassium compounds as already set forth, and also, because of free alkalinity, tend to neutralize morbidly developed acid in the blood or tissues, to diminish the acidity of the urine, or even to reverse the reaction of that secretion to the alkaline. Probably in part because of the peculiar action of potassium as such, and partly because of the alkalinity of potassa, this compound is of special efficacy in the diatheses leading, severally, to rheumatism, gout, and lithæmia, and in the skin diseases urticaria, psoriasis, eczema, lepra, acne, and recurring boils.

The medical uses of potassa are for the purposes above detailed, yet, except as a caustic, it is not so much used as its acknowledged potency would seem to suggest, simply because it is rough and harsh, while at the same time other and milder potassic compounds are equally efficient. Thus for direct local alkaline action the carbonates, and for constitutional alkalizing, the citrates and tartrates, are respectively preferable.

To *cauterize* with potassa, the adjacent parts should be protected by adhesive plaster, and the doomed area, if covered by skin, should then be rubbed with a moistened stick of the caustic until discoloration appears. If the part be a mucous membrane or raw tissue, a single light sweep of the caustic is sufficient for even a profound cauterization. In no case should the agent be used where an exact limitation of the caustic effect is essential, as where the part to be destroyed is in close contiguity to important, or large, blood-vessels or organs. To render the corrosion of potassa less spreading, a mixture of equal parts of potassa and quicklime has been devised, and is official in the United States Pharmacopœia, under the title *Potassa cum Calce*, Potassa with Lime. This mixture, commonly known as *Vienna caustic*, is a grayish-white, deliquescent powder, soluble in hydrochloric acid. It is less diffusive in its action than potassa, by reason of the peculiar action of the lime of its constitution. For use the powder is made into a paste with a little alcohol.

For a potassa lotion, the solution of the Pharmacopœia is to be prescribed, diluted with several volumes of water. For internal giving, the same solution is employable, in doses ranging from 0.65 to 4 gm. (♏ x. to fl. ʒ i.) greatly diluted with some syrupy or mucilaginous fluid. But potassa, as an internal remedy, is very objectionable for any but a very temporary medication.

Normal Potassium Carbonate: $(K_2CO_3)_2.3H_2O$. The salt is official in the United States Pharmacopœia under the title *Potassii Carbonas*, Potassium Carbonate. It is a white, granular powder, very deliquescent, odorless, having a strongly alkaline taste, and an alkaline reaction. It is readily soluble in water, but is insoluble in alcohol. Potassium carbonate is so deliquescent that unless carefully put up in well-stoppered bottles it will eventually transform itself into an oily fluid, by dissolving in moisture attracted from the atmosphere.

Physiologically, potassium carbonate is simply a weakened potassa, yet not so weak but that, in strong solution, it may prove a corrosive poison. Its use is mainly in ointment or in aqueous solution as a strong alkaline potassic application in skin diseases. Ointments of the carbonate are made with lard, the strength ranging from two to ten per cent. Solutions of the salt for service as lotions range in strength from one-half to one per cent.

Acid Potassium Carbonate: $KHCO_3$. The salt is official in the United States Pharmacopœia under the title, *Potassii Bicarbonas*, Potassium Bicarbonate. It occurs in colorless, transparent, prismatic crystals, and differs from the normal carbonate in being permanent in the air. It is odorless, and of a slightly alkaline taste and reaction. It is soluble in 3.2 parts of cold water and is decomposed by boiling water. It is practically insoluble in alcohol. It should be kept in well-stoppered bottles.

Physiologically, this carbonate is similar to the normal salt, but weaker. The taste is mild, though mawkish; the alkalinity feeble, and the salt is hardly capable of being corrosive. The uses are, locally, as an alkaline application in skin disease, in preparations such as are described above in speaking of the normal carbonate, and, internally, as a stomachic or constitutional alkali. But for stomachic purposes sodic salts are more agreeable, and for constitutional alkalies the potassic citrates and tartrates. If given internally, the dose ranges from 1 to 4 gm. (from gr. xv. to ʒ i.).

Normal Potassium Citrate: $K_3C_6H_5O_7.H_2O$. This salt, formerly known as *Salt of Riverius*, is official in the

United States Pharmacopœia under the title *Potassii Citras*, Potassium Citrate. It is a deliquescent salt occurring in transparent prismatic crystals or as a granular powder. It is odorless with a slightly alkaline and cooling taste. It dissolves readily in water, but slightly only in alcohol. Potassium citrate is a not disagreeable tasting, cooling salt, which is devoid of all local harsh effect, and yet after absorption seems to undergo decomposition as regards its acid radical, becoming converted into a carbonate. Such secondarily formed carbonate thereupon exerts the usual action of an alkaline potassic compound, as detailed under Potassa above. Potassium citrate is thus available as a gentle diuretic, diaphoretic, and cardiac sedative in fevers, and also as an agreeable and yet efficient agent for constitutional alkalizing. It may be given freely in doses of from 1 to 2 gm. (gr. xv. to xxx.) in water or in effervescing water, sweetened or aromatized to taste. In order to obtain the salt in effervescing solution, in which condition it is more grateful to a fevered stomach, the following preparations are official in the United States Pharmacopœia: *Potassii Citras Effervescens*, Effervescent Potassium Citrate. This preparation is a powder consisting of a dry mixture of citric acid, potassium bicarbonate, and sugar. When added to water, reaction instantly takes place between the citric acid and the potassium bicarbonate, with the formation of potassium citrate and carbon dioxide. One or two teaspoonfuls make a dose, to be taken in water and drunk during effervescence. Such effervescent solution takes the place of the old, so-called "neutral mixture," or "mixture of citrate of potassium," formerly but now no longer official. Such mixture was simply fresh lemon juice, strained, and neutralized with potassium bicarbonate. *Liquor Potassii Citratis*, Solution of Potassium Citrate: This is a simple aqueous solution of the salt effected by bringing together in water six per cent. of citric acid and eight per cent. of acid potassium carbonate. It contains nine per cent. of potassium citrate, and should be made fresh when wanted. But the effervescing draught made from the "effervescent citrate" is a better way of getting the same solution.

Potassium Acetate: $KC_2H_3O_2$. The salt is official as *Potassii Acetas*, Potassium Acetate. This is an exceedingly deliquescent salt, having a warming, mildly pungent, salty taste. Very soluble in water and in alcohol. It must be kept in well-stoppered bottles. Potassium acetate is generally similar in properties to the citrate, undergoing, like that salt, conversion into a carbonate after absorption, and so operating constitutionally as a potassic alkali. It is not so agreeable to the taste nor so grateful to the stomach as the citrate, but has a considerable reputation as a diuretic, as evidenced by its old cant name of *Sal diureticum*. As a matter of fact, however, it—often, at least—does not prove more diuretic than the citrate or other potassic salts. Potassium acetate may be used for the same purpose and in the same doses as the citrate.

Potassio-sodium Tartrate: $KNaC_4H_4O_6.4H_2O$. This well-known salt, commonly called Rochelle or Seignette's Salt, is official in the United States Pharmacopœia under the title *Potassii et Sodii Tartras*, Potassium and Sodium Tartrate. This salt occurs in colorless, rhombic crystals, or as a white powder. It is odorless, with a cooling, saline taste, and effloresces slightly in dry air. It dissolves readily in water, but is almost insoluble in alcohol. This salt is decomposed by acids, with the production of a crystalline precipitate of acid potassium tartrate ("bitartrate"), and also by soluble plumbic, calcic, and basic salts.

Rochelle salt is mild in flavor and local action, agrees well with even a sensitive stomach, and differs from the citrate and acetate in being of low, rather than high diffusion power. Hence in full dose it is purgative, but as compared with the average of saline purges ranks among the milder. In non-purgative dose, especially if given well diluted, it is absorbed, changes to carbonate after the manner of the citrate and acetate, and then exerts, as efficiently as other salts, the specific action of alkaline potassic compounds. From its mildness it is preferred by many to other potassium preparations as a constitutional alkali in rheumatism, lithæmia, etc. For constitutional action as an alkali or as a diuretic the salt is to be given in comparatively small but frequently repeated doses, not to exceed, as a rule, 4 gm. (℥ i.) at a time. As a purge, the dose will range, according to the intensity of the effect desired, from 8 gm. to 30 gm. (℥ ij. to ℥ i.) in water, plain or aromatized. A favorite mode of administration is in effervescent solution, as obtained by use of the official *Pulvis Effervescens Compositus*, Compound Effervescing Powder. This is the well-known *Seidlitz powder*, and consists of two parts, one a powder in blue paper, made up of about 2.60 gm. (gr. xl.) of acid sodium carbonate ("bicarbonate") and about 8 gm. (℥ ij.) of Rochelle salt, and the other a smaller powder in white paper, consisting of about 2.25 gm. (gr. xxxv.) of tartaric acid. Each portion is to be dissolved separately in about 60 gm. (fl. ℥ ij.) of iced water, sweetened and aromatized if so desired, and the solution of the acid then to be added, half at a time, to that of the salts, and the potion drunk during the effervescence which immediately occurs. The reaction upon mixing the solutions is, of course, the decomposition of the sodium carbonate by the tartaric acid, with the formation of a sodium tartrate and the evolution of carbon-dioxide gas. A single "powder" is a medium purgative dose.

Acid Potassium Tartrate: $KHC_4H_4O_6$.—This well-known salt, the *cremor tartari* or *cream of tartar* of common parlance, is official in the United States Pharmacopœia under the title *Potassii Bitartras*, Potassium Bitartrate. It is prepared by a process of purification from the impure salt occurring as an incrustation developing in casks of wine, especially of acid wines. Such incrustation is called *argol*, or *crude tartar*, the latter name being derived from the *tart* quality of the wines that furnish the greatest yield of the substance. The purified salt may be in crystals, but as furnished to pharmacists it is in fine powder, to which condition especially the cant name of "cream of tartar" applies. The salt is permanent in the air, and has an agreeable, subacid taste. It is peculiar in being comparatively insoluble in cold water (201 parts), although much more soluble in boiling water (16.7 parts). It dissolves sparingly only in alcohol. The solubility in water can be increased till the salt dissolves in one part, by the addition of borax, two parts to five of the tartrate. Commercial cream of tartar always contains more or less calcium tartrate, which salt is a normal constituent of crude tartar, but, according to the pharmacopœial standard, the proportion should not rise above six per cent. Besides this natural impurity adulterations are often found, such as chalk, gypsum, clay, sand, or flour. Purchase of the article in crystals affords the surest way to avoid these sophistications.

Cream of tartar is a cooling, acidulous salt, agreeing well with delicate stomachs. Like Rochelle salt, it is of low diffusion power and is therefore cathartic, and in its purgative action is characterized by the copiousness of the watery dejections it determines. For this reason it is a favorite ingredient of cathartic mixtures intended for carrying off a dropsical effusion, such as the compound powder of jalap of the United States Pharmacopœia. In non-purgative dosage the salt is refrigerant and diuretic—perhaps more generally diuretic than any other potassic compound, but, unlike the other potassic salts of organic acids, it does *not* appear to suffer the usual conversion in the blood into a carbonate. Such, at least, is the inference from the clinical observation that cream of tartar is not of the same value for constitutional alkalizing as are, respectively, the other tartrates, the citrate, and the acetate. The uses of the present salt are therefore restricted to its application as a purge, a diuretic, of a grateful, cooling saline in feverishness. The doses are substantially the same as those of Rochelle salt for the same several purposes. The powdered cream of tartar may be suspended in water or mixed with molasses for giving as a purgative, or, for use as a fever draught,

may be dissolved in boiling water, and the solution, when cold, given sweetened with sugar. The old-fashioned, so-called *imperial* draught is made by dissolving one per cent. of cream of tartar in boiling water, adding one per cent. of sliced lemon and eight of white sugar. *Cream of tartar whey*, so called, consists of one and a half per cent. of the salt in milk.

Normal Potassium Sulphate: K_2SO_4. The salt is official in the United States Pharmacopœia under the title *Potassii Sulphas*, Potassium Sulphate. It is a permanent salt, occurring either in transparent, colorless rhombic crystals, or as a white powder. It dissolves in about 9.5 parts of cold water, and in 4 parts of boiling water. It is insoluble in alcohol. Potassium sulphate is, like all sulphates, comparatively harsh, and in large concentrated dose has caused fatal irritant poisoning. It is of low diffusion power, therefore purgative, and its medical use has been as a saline cathartic. It is, however, little used, because of its occasional harshness. The dose will range from 8 to 16 gm. (℥ ij. to iv.), to be given in solution, well diluted. This is the salt formerly called *vitriolated tartar* and *sal de duobus*.

Potassium Nitrate: KNO_3. This salt, the well-known substance *nitre*, or *saltpetre*, is official in the United States Pharmacopœia under the title *Potassii Nitras*, Potassium Nitrate. This is a permanent salt, occurring in colorless, transparent, six-sided rhombic crystals, or in a crystalline powder. It is odorless, with a cooling, pungent taste. It dissolves in about four parts of cold water and in less than one part of boiling water. It is almost insoluble in alcohol. It deflagrates when thrown upon red hot coals. Under the name of *sal prunelle* or *crystal mineral*, nitre is also to be found in the shops in small circular cakes, moulded from the salt, fused. Commercial refined saltpetre is the quality of the salt to be employed in medicine, and an article in small crystals is preferable to one in large, since large crystals are apt to contain some water, mechanically entangled in the process of crystallization.

Potassium nitrate, like the sulphate, is a powerful salt in local operation, but, unlike the sulphate, is of high diffusion power, so that even a large dose will be comparatively quickly absorbed. Taken internally it is therefore doubly potent, and even poisonous, a large dose exciting severe irritant poisoning, and consecutively producing in the highest degree the dangerous constitutional effects of the potassic compounds generally. The salt undergoes no decomposition in the system, and is therefore incapable of exerting any *alkaline* effects, either local or constitutional. In medicinal doses nitre produces the antifebrile effects of the potassium salts generally, being cooling and grateful to the stomach, and tending, after absorption, to quiet a bounding heart and at the same time to prove gently diuretic and diaphoretic. Being of high diffusion power, it does not purge except in considerable dose. A peculiar property of nitre is that, mixed with fresh venous blood, it turns the blood bright red and impairs its coagulability; but in spite of much theorizing, the fact does not lead to any special therapeusis. Medicinally nitre is nowadays rarely used internally, except as an ingredient of fever draughts or of diuretic mixtures. Formerly it had considerable reputation in the treatment of acute rheumatism, being pushed in full doses, but alkalies and salicylates have now supplanted the salt for this application. The single dose of nitre should not exceed 2 gm. (gr. xxx.), and the salt is best given in dilute solution. Considerable single amounts, especially if in concentrated condition, are dangerous, but so rapid are the absorption and elimination of the nitrate that, by means of small and frequent doses, properly diluted for the taking, a very large quantity—from 30 to 62 gm. (℥ i. or ij.)—can be passed through the system in the course of a single day without injury. A special therapeutic application of saltpetre is the inhalation, for the relief of spasmodic asthma, of the fumes arising from its combustion. As usual in antispasmodic medication, some cases find relief from the agent and others do not, or even suffer aggravation thereby. For the application, white unsized paper, free from wool, is steeped in a twenty-five-per-cent. aqueous solution of nitre and allowed to dry. A piece is then burned, and the patient, with the face as near as can be borne without undue irritation, inhales the white fumes that are given off. Such prepared paper is official in the United States Pharmacopœia under the title *Charta Potassii Nitratis*, Nitrate of Potassium Paper. It is sometimes called *asthma paper*. Toxicologically nitre is of some importance, cases of poisoning by the salt not infrequently occurring. An ounce, swallowed at a draught, has proved fatal in a number of instances. Taken, as it commonly is in such cases, in pretty strong solution in mistake for purgative salts, it produces symptoms of severe gastro-intestinal irritation—burning pain in the stomach, violent vomiting and purging, the dejecta being sometimes bloody, and general collapse. Whether the constitutional symptoms are merely symptomatic of shock from the irritation, as occurs so commonly with powerful irritant poisons like the mineral acids, or whether they are in part the expression of the specific potassium poisoning of nerve and muscle, is not always easy to determine, and is of no practical bearing on the treatment of the poisoning. Special symptoms are urinary suppression, with strangury, tenesmus, and bloody urine, and aphonia. These may or may not occur. Death may take place in two hours after the swallowing of the poison. There is no chemical antidote to nitre, so that the treatment of a case of poisoning must be conducted simply on general medical principles.

Potassium Chlorate: $KClO_3$. The salt is official in the United States Pharmacopœia under the title *Potassii Chloras*, Potassium Chlorate. This is a permanent salt, occurring in colorless, shining, prismatic crystals or plates, odorless, and having a cooling, saline taste. It dissolves in 16.7 parts of cold water, but in 1.7 parts of boiling water. It is slightly soluble only in alcohol. If heated or triturated with organic substances, such as sugar, tannic acid, or cork, or with easily oxidizable chemicals, such as sulphur or phosphorus, a dangerous explosion is likely to occur. The salt should, therefore, be kept in glass-stoppered bottles and handled with care.

The chemical relationship between chlorates and nitrates is paralleled, as usual in such cases, by resemblance in physiological action. The present salt thus closely resembles nitre in its effects, the principal difference being in intensity of power, the chlorate being the weaker—a fact probably in part due to the less ready solubility of the salt. Yet the chlorate is strong enough, in full concentrated dose, to be fatally poisonous, with symptoms of intense gastro-intestinal irritation, and, in too lavish medicinal use, as has been the fashion in diphtheria, to be the likely cause of much of the nephritic disorder thoughtlessly assigned, in etiology, to the disease instead of to the medicine.[3] For, like the nitrate, the chlorate of potassium has a distinct tendency to irritate the kidneys, which, in the choked condition of the organs common in diphtheria, may easily lead to dangerous congestion. Potassium chlorate was forced into medicinal notoriety largely by the theoretical consideration that, since chlorates readily part with some of their oxygen, thus proving active oxidizing agents, the salt ought to serve as a constitutional source of oxygen within the animal system, and so prove of benefit in diseases that tax the nutritive powers of the organism. Clinical experience, however, does not bear out the prognostications of theory, and physiological chemistry accounts for the failure by finding that, under the conditions of the animal circulation, potassium chlorate suffers no decomposition, but is eliminated by the kidneys and other organs unchanged. The only rational place of this salt in medicine hinges on the following fact: The chlorate is largely eliminated by the salivary glands, and probably also by the mucous follicles of the mouth and pharynx, and in inflammatory conditions of the surface textures of these parts distinctly tends to healing. Sore mouth or sore throat, catarrhal or ulcerative, is therefore treated with advantage with potassic chlorate in the form of

wash or gargle, or, better still, for the sake of continuous application to the parts through the avenue of the saliva and buccal mucus, given internally. A convenient practice is to prescribe a five-per-cent. aqueous solution of the salt, which is upon the verge of a saturated solution, and direct this to be used as a mouth wash or gargle every two hours, and at the same time a couple of teaspoonfuls to be taken internally. Such quantity will represent about 0.50 gm. (gr. viij.) of the salt—a moderate single internal dose. Among the varieties of buccal disorders amenable to potassium chlorate may be mentioned mercurial stomatitis; and some practitioners even combine the potassium salt with their mercurials in constitutional mercurialization, with the view of lessening the risk of salivation. In diphtheria, also, the chlorate is a good deal used, the good effects being probably the local ones only, and the risk to kidneys or heart from too free dosage being genuine and considerable. Of preparations, the United States Pharmacopœia makes official *Trochisci Potassii Chloratis*, Troches of Potassium Chlorate, the ingredients being the salt, sugar, and tragacanth, and a little of spirit of lemon for flavoring. Each troche contains 0.30 gm. (about gr. v.) of chlorate. In ordinary sore throats or sore mouths, for the treatment of which affections the preparation is especially intended, these lozenges, if allowed to dissolve naturally without chewing, may be taken continuously through the day.

Edward Curtis.

[1] Ringer and Murrell: Journal of Physiology, i., p. 88.
[2] Basham: Practitioner, vol. v., p. 259.
[3] Jacobi: Medical Record, vol. xv., p. 241.

POTASSIUM, TOXICOLOGY OF.—Independently of the corrosive action which characterizes the oxid, hydroxid, and carbonates of potassium, those compounds of potassium with acids, which have little or no toxic qualities, such as the chlorid, sulfate, or tartrate, exert a distinctly poisonous action. In this respect the potassium compounds differ notably from those of sodium.

Experiments on dogs demonstrate that the injection of from 1 to 2 gm. of potassium chlorid, nitrate, sulfate, etc., directly into the circulation, produces death very quickly from cessation of the heart's action. Smaller quantities produce a slowing of the pulse, more or less gastritis, dyspnœa, convulsions, and sometimes death.

Diluted doses seem to have a less serious effect than the same weight of the salt in a concentrated form.

All fatal cases of poisoning in the human subject by the potassium salts of non-toxic acids have been due to ignorance or accident.

Potassium Bromid—KBr.—Two cases have been reported in which death followed the administration of very large quantities of potassium bromid. Duncan (*British Med. Journal*, 1882, Part I., p. 616) relates a case of a child three years old, who died in less than half an hour after taking between 5 and 6 gm. of the drug. The other case was that of an adult female, to whom was administered by her physician 4.2 gm. every four hours for four days. The patient died five days after taking the last dose (Hamer, *Columbus Med. Journal*, vol. iii., p. 259).

Aside from bromism several non-fatal cases are on record, in some of which the patient exhibited a peculiar idiosyncrasy as regards the tolerance of this substance.

Potassium Chlorid—KCl.—The poisonous action of this compound upon animals has been to some extent investigated. When injected into the blood supply of a nerve, the latter loses its excitability. The salt is eliminated with the urine, but much more slowly than sodium chlorid. I find no fatal cases reported as a result of the poisonous action of this salt upon human beings.

Potassium Nitrate—KNO_3.—This substance is commonly known by the name of nitre or saltpetre. Its use as a preservative of meat and other articles, and among agriculturists in the treatment of diseases of domestic animals, makes it one of the common household drugs.

In poisoning by potassium nitrate it is quite certain that the acidulous constituent plays no small part in the toxic action. This conclusion follows from observations upon man and lower animals, when subjected to the action of sodium nitrate (see two cases of poisoning by sodium nitrate, Collischorm, *Deutsche med. Wochenschrift*, vol. xv., p. 844). Large doses (3–5 gm.) cause uneasiness in the stomach and intestines, followed by vomiting, diarrhœa, and generally a frequent desire to urinate. Fifteen to twenty grams produce an acute gastro-enteritis, the vomit tinged with blood, pronounced weakness, cold sweats, and cramps, especially in the calves of the legs.

Woodman and Tidy ("Forensic Medicine and Toxicology") report six fatal cases in which the dose varied from 15 to 45 gm., and the duration from two to sixty hours. Wormley ("Micro-Chemistry of Poisons," p. 69) mentions an instance of an aged man who died in half an hour after taking a quantity of potassium nitrate in mistake for sodium sulfate. Size of dose not given. Bailey (*Phila. Med. and Surg. Reporter*, June, 1872, p. 75) records a recovery after taking 125 gm.

Lesser (*Vierteljahr. f. ger. Med.*, 1898, 3. F., xvi., 93) reports the case of a woman aged forty-six, who died twelve hours after taking about 70 gm.

Most of the cases of poisoning by potassium nitrate have been due to mistaking the substance for magnesium or sodium sulfate or sodium chlorid. In several instances overdoses produced serious results.

The symptoms consist of a severe burning pain in the abdominal region, nausea, vomiting, purging, vomit and stools containing blood, coldness of the extremities, facial tremors, weak and irregular pulse, and collapse. Difficult respiration was observed in some cases.

No chemical antidote is known. The treatment should be to remove the poison from the stomach, give mucilaginous drinks, and treat the symptoms.

Post-mortem Appearances.—The stomach is usually highly inflamed, with dark-colored patches, and the mucous membrane partially detached. Similar appearances have been observed in the duodenum and intestines. Sometimes the indications of asphyxia are present; the lungs are congested, and the right heart is filled with thick, very dark blood.

Potassium Sulfate—K_2SO_4.—This substance was formerly employed to produce abortion, several fatal results having occurred from such use. Bayard reports a case (*Ann. d'Hygiène*, April, 1842) in which 33 gm. of potassium sulfate were administered as a laxative after delivery. Death followed in two hours. A case is recorded in the *Medical Times and Gazette*, 1856, p. 420, in which 8 gm., administered to produce abortion, caused death.

The symptoms noted were pain in the stomach, nausea, vomiting, purging, and cramps in the limbs. A post-mortem examination showed the stomach to contain a reddish liquid, and the mucous membrane to be of a purple color.

Potassium bitartrate—$KHC_4H_4O_6$.—Although this substance, commonly called cream of tartar, may be found in every household, I find recorded but two fatal cases of poisoning by its use. In Tyson's case (*Lancet*, vol. i., 1837–38, p. 162) death followed in four days the taking of 125 gm. Roger reports a case (Friedreich's *Blätter f. ger. Med.*, xxviii., 1887, p. 196) in which 200 gm. caused death in twelve hours.

The prominent symptoms were severe abdominal pain, persistent vomiting and diarrhœa, thirst, feeble pulse, and paralysis of the legs. A post-mortem examination showed the interior surface of the stomach covered with red streaks and patches, and the intestines somewhat inflamed.

Analysis.—Since potassium compounds are normally present in the body fluids and tissues, the analyst cannot report them as having been introduced into the system, unless he can prove them present in abnormal quantity, or in unusual combination. Cream of tartar, on account of its sparing solubility, may be found in the stomach in the solid form.

Louis Warner Riggs.

POTT'S DISEASE. See *Spine, Diseases of.*

POWDER SPRINGS.—Cobb County, Georgia. Post-Office.—Powder Springs.

Access.—Take Western and Atlantic Railroad to Marietta, and from thence private conveyance to the springs, ten miles distant.

These springs were discovered about fifty years ago, but for want of improvements their reputation has been confined to the surrounding country. There are four springs, one of which has been approximately analyzed as follows:

One United States gallon contains: Iron sulphate, gr. 2; calcium sulphate, gr. 1; iron oxide, gr. 1.50. Total solids, 4.50 grains. The contained gases are: Carbonic acid, 1 cubic inch; hydrogen sulphide, 1.5 cubic inches.

The other springs contain about the same ingredients. The flow of water is about two and a half gallons per minute. The waters are evidently chalybeate, and we are informed that they have been found highly useful in depressed and debilitated states of the system where a fairly potent ferruginous tonic is indicated.

James K. Crook.

POWHATAN LITHIA AND ALUM SPRINGS.—Powhatan County, Virginia. Post-Office.—Tobaccoville.

Access.—From Richmond viâ Farmville and Powhatan Railroad to Tobaccoville station, forty-eight miles west, thence three-quarters of a mile by private conveyance to springs.

These springs are two in number, one known as the Lithia, the other as the Alum Spring. They yield about five hundred gallons of water per day. A qualitative analysis of the lithia water by Dr. W. H. Taylor, State chemist at Richmond, showed the presence of lime, magnesia, soda, lithia, potash, iron, silica, sulphuric acid, carbonic acid, and chlorine. The alum water was analyzed at the Smithsonian Institution and found to contain about the same ingredients, except that the lithia was replaced by alum. The water is sold to some extent, but the property has never been much developed and no hotel accommodations have been provided.

James K. Crook.

POWNAL SPRING.—Cumberland County, Maine.—Post-Office.—West Pownal. Hotel.

Location.—Eighteen miles from Portland and ten miles from Poland Spring.

Access.—Viâ Grand Trunk Railroad to West Hanover Station, or Maine Central Railroad to Pownal Spring Station.

The surroundings of the spring are very pleasing to the eye. The White Mountains, in the distant northwestern horizon, form an impressive background, while to the southward a wide panorama is unfolded to the view of the beholder, even Portland harbor being easily seen by the aid of a small glass. The location of the spring is upon land higher than any other in the immediate vicinity, thus giving no opportunity for surface pollution. The water comes apparently from the solid rock, and is clear and sparkling. The average temperature of the water as it emerges is 42° F. This is subject to a variation of only one degree in either direction during the entire year. The following analysis was made by State Assayer Franklin C. Robinson, professor of chemistry at Bowdoin College in 1893:

Reaction neutral. One United States gallon contains: Silica, gr. 0.41; iron carbonate, gr. 0.04; calcium carbonate, gr. 0.33; magnesium carbonate, gr. 0.02; sodium carbonate, gr. 0.09; sodium sulphate, gr. 0.08; sodium chloride, gr. 0.16; potassium carbonate, gr. 0.02. Total solids, 1.15 grains.

Organic and volatile matter, 0.01 grain. The water is bottled and sold. It is recommended for the table, and is said to be useful in dyspeptic and urinary complaints, but the remarkable attenuation of the water would appear to require the ingestion of large quantities in order to secure appreciable therapeutic effects.

James K. Crook.

PREMATURE INFANTS.—By premature infants we mean those babies which are born before the two hundred and eighty days, considered the normal length of intra-uterine gestation, have elapsed, and after the period of viability of the child. This period, however, is only arbitrary, and varies within relatively wide limits. In this respect much depends upon the nourishment of the fœtus prior to birth, the health of the mother during pregnancy, the conditions demanding or leading up to the interruption of pregnancy, the character and duration of labor, the difficulty attending its birth, as well as the care of the infant after its advent into the world. Consequently, in a syphilitic, tuberculous, or albuminous mother, in a case of placenta prævia or of accidental hemorrhage or eclampsia, in a dry, protracted labor, after a breech, forceps, or version delivery—in all these conditions, on account of the immature development of the vital organs, the chance of survival of the baby is very much reduced.

There are cases on record in which it is claimed that the child in utero reached only the twenty-fourth week and yet lived. Perhaps, in the future, advances in our knowledge of their care will enable such infants, born before the date supposed to be compatible with life, to survive. It is more likely, however, that such cases are reported with mistaken calculations.

There are no characteristic appearances, no exact development upon which we can definitely state the age of the infant when it is born. The weight, the length, and development all vary for a given length of gestation and statistics given are only approximate, but yet of sufficient value to guide us somewhat in the management of such infants. It is therefore generally the rule that if the infant is born alive, we must endeavor, without regard to size and characteristics, by the best care and latest knowledge, to preserve its existence.

The general characteristics in the clinical picture of a premature child are as follows: The head is very large in proportion to the body, the abdomen is prominent, the movements are very weak, the body is limp, and the child has a senile, emaciated, and wizened-up appearance.

At the *twenty-fourth week* of intra-uterine life a fœtus, when born, usually breathes feebly. Some cannot cry, although others will give a faint mewl. The infant is covered by lanugo. Its eyelids have separated, though it is so feeble that it cannot often open and shut them. There is very little subcutaneous adipose tissue. It measures about 28–34 cm. (11¼–13¾ in.) in length and weighs 676 gm. (℥ xxiii.). The testicles are only at the inguinal rings. This fœtus may live from a few hours to fifteen days, but would in all probability die from insufficient assimilation after a weak digestion of food, from rapid loss of heat or from imperfect respiration. At the *twenty-eighth* week the fœtus measures in length from 35 to 38 cm. (13.75 to 15 in.) and weighs 1,170 gm. (41¼ oz.). The soles of the feet and palms of the hands are not covered by lanugo. The pupillary membrane, which had hitherto obscured the pupil, has now disappeared. The skin is still wrinkled, covered by vernix caseosa. The child still has an emaciated appearance. Such an infant with good care can live, but most of them die. There persists, however, in the minds of some of the old practitioners and among the laity, the idea that a child born at the seventh month is more apt to survive than one born at the eighth month. Of course this is nonsense, for the development and functions of the vital organs are by far less advanced at the earlier than at the later date, and it stands to reason that the elder fœtus will be stronger thereafter. Professor Parvin, in his "Science and Art of Obstetrics," tells how this superstition has descended through more than two thousand years from Hippocrates. The Greek explained it in this manner, that the fœtus is placed with its head at the fundus in the uterus until the seventh month when the increasing weight of the head causes it to descend to the lower zone. As soon as this occurs, the fœtus attempts to escape, and if it is strong it succeeds; but if the attempt fails, it tries again