

Group containing—

SULPHATE OF POTASH.

” SODA.

” MAGNESIA.

PHOSPHATE OF SODA.

TARTRATE OF POTASH.

BITARTRATE OF POTASH.

TARTRATE OF POTASH AND SODA.

WE have adopted this grouping with slight modification from Buchheim's excellent work on therapeutics.

With the exception of the sulphate and bitartrate of potash, these substances are freely soluble in water.

The sulphates have a very disagreeable bitter taste, which in the phosphate of soda is but slight, and in the tartrates is absent.

They are all purgative, producing watery evacuations, which is probably due to their very low diffusion-power.

They have little or no affinity for animal textures, nor much attraction for water, whence they effect few changes in the organic constituents of the body.

While they all act as purgatives, producing watery evacuations, they excite very little irritation in the mucous membrane.

How do they produce their purgative effect?

Purgatives may act in one of two ways, or in both combined.

Some purge by increasing the moisture of the intestines, and so facilitating the passage of the contents along the canal; others act by increasing the peristaltic action of the intestines, so that the contents are more rapidly urged towards the rectum; while most purgatives combine both modes, although one action usually predominates.

The watery character of the motions shows without doubt that, in part at least, these drugs purge by augmenting the

moisture of the contents of the intestines. This augmentation is effected in three ways; the medicine may cause water to flow from the blood into the intestines, or it may excite the mucous glands of this tract to increased secretion, or it may effect the retention of the water already present in the intestines. From Buchheim's careful observations it appears that these medicines purge solely in virtue of their power to retain in the intestines the water existing there. He concludes that they produce no flow of fluid from the blood, no increased secretion from the mucous glands, from the fact that, after purgation with these medicines, no albuminous substances are found in the fæces.

How do they retain in the intestines the water existing there?

These salts, as we have said, possess a very low diffusion-power; they pass slowly and hardly, through animal membranes; that is, they pass from the intestines to the blood with difficulty, so that they are long retained in the canal. As, however, they hold with considerable tenacity both the water of solution and that encountered in their course through the body, they prevent this water passing from the stomach and intestines to the blood. It is not generally held that the members of this group act purgatively by increasing markedly the peristaltic contraction of the intestines, since none produce much pain and griping. It appears then that these medicines are mere expellents from the intestines, not eliminators of the effete material from the blood, although by emptying the intestinal canal they prevent contamination of this fluid by the products of fæcal decomposition.

An excellent way to administer some of these salts is in the form of Pullna or Friedrichshall waters, in doses varying from a wine-glassful to half a tumblerful or more. Usually one dose before breakfast is sufficient; if not, a second, and even a third dose may be taken in the course of the day. It is advisable to mix the natural water with a third or an equal quantity of hot water; for if taken cold it is sometimes liable to "lie heavy on the stomach." Usually a wine-glassful of



Pullna water, with an equal quantity of hot water, is sufficient to open the bowels without much griping or pain.

A wine-glassful of Friedrichshall water in a breakfast cupful of hot water is very useful in bilious sick headache. The best time is before breakfast, but it is useful at any time. It stays the nausea and soon removes the headache, sometimes without purging. The taste of this mixture is not very disagreeable. Pullna or Friedrichshall water mixed with milk is a good purgative for children, the milk disguising the bitterness of the natural waters.

An orange or two eaten before breakfast is a pleasant and often effectual way of overcoming moderate habitual constipation; and sometimes indeed this plan overcomes the more obstinate forms. A glass of cold water before and an orange soon after breakfast is another good means of obviating constipation.

Carlsbad waters are eminently useful in many abdominal diseases. The imported waters are especially efficacious when a dietary is adopted similar to that enjoined at Carlsbad. The water should be warmed to about 100° to 110°, and the patient must drink three to six tumblerfuls before breakfast, prolonging the drinking over an hour or more, and if possible whilst taking exercise in the open air. Dr. Stephen Ward says, "even when first taken and in moderate quantity they usually cause pulpy slimy stools of dark colour and offensive odour. The stools are generally frequently repeated and the patient is astonished at the quantity that sometimes comes away, but in many persons no very evident symptoms beyond the purgative action attend the drinking of the waters." I have rarely seen them purge, because perhaps, I have chiefly used them in obstinate constipation. The quantity to be taken depends on their effects. It is better to begin with three tumblerfuls and gradually increase the quantity to four, five or six according to the action. This treatment must be continued three weeks or a month. It often induces some weakness. It reduces stoutness and sometimes even makes patients very thin. But if it produces much depression or excites nervous symptoms,

a smaller quantity must be taken and the course must be limited to a fortnight or three weeks. The good effects of this treatment are sometimes not apparent, till a week or so after the course. The diet at Carlsbad is extremely simple. "Fat, butter, cream, pastry, cheese, rich meats, as pork, goose, suesages, salmon, mackerel, herrings, anchovies, entrées and other dishes, seasoned with spices, pepper, onions, garlic, &c., are to be avoided. Dressed salads, cucumber, and uncooked fruit generally are objected to as being indigestible and likely to cause flatulence and irritation of the bowels. The use of spirits is absolutely forbidden, and the wine of the country or the lighter French wines are permitted only sparingly and in cases especially requiring a certain amount of stimulus. The breakfast which is usually taken about an hour after drinking the last cup of water, consists merely of weak tea or coffee, with milk and a little sugar, and small well baked rolls or second day's bread; meat, fish, or eggs being excluded, except for the very delicate. The dinner which takes place at one, consists but of three courses; soup free from grease and spices, and thickened with barley rice or vermicelli; meat, as beef, mutton, lamb, poultry or game, with well boiled fresh vegetables; and a light simple pudding or a compôte of stewed fruit: a cup of coffee may be taken in the afternoon; a light supper is taken at eight o'clock, smoking in moderation is not objected to." (Dr. Stephen Ward.)

This treatment is extremely useful in obstinate habitual constipation and by means of it I have cured some of the most rebellious cases. In such instances it may not relieve the bowels for some days, indeed, even a week may pass without relief. In other cases it at once produces one or two soft copious natural evacuations, and on discontinuing the water the bowels act daily. After some months, however, a recourse to the waters may again become necessary owing generally to some fault in the patient's habits. In cases of obstinate constipation simply it is not necessary to enforce very strictly the rigorous diet first described.



Again in cases of the following kind Carlsbad waters are very useful. A middle aged woman accustomed to eat and drink somewhat too freely suffers from acidity, much flatulence, constipation, with attacks of pain at the epigastrium, or over the liver, or between the shoulders, the conjunctiva becoming rather jaundiced and the complexion sallow. In cases like this a well regulated diet greatly assists the action of the waters. This treatment is also useful in gall stones and gout. It is not uncommon to hear patients say they have tried Carlsbad waters without good results, but then it is found that they have simply taken Carlsbad salts dissolved in a small quantity of water. In such a form the Glauber salts purge, but fail to yield the excellent results, when given largely diluted with water; I have no doubt that the large bulk of water plays a prominent part in the therapeutic effects.

The medicines now under consideration are not to be indiscriminately used. The bitartrate of potash is employed in both general and local dropsies, but more frequently in general dropsies, and is especially used as a hydragogue cathartic in Bright's disease, to prevent watery accumulation to a dangerous degree in the cellular tissues, or in the cavities containing the important organs, as the heart and lungs. With the water too it draws off the effete and poisonous matters which, in this disease, are retained in the blood. Being mere evacuants of the intestines, it might be thought that these remedies are ineffectual to withdraw either water or urea from the system; but a little reflection will show us this is not the case.

During digestion, a considerable quantity of fluid is poured into the intestines by the stomach, the liver, and the pancreas. Now, if the blood contains poisonous matters, some portion of these must contaminate the fluids secreted by these organs. These medicines, retaining in the canal much of this fluid, until it undergoes expulsion through the anus, thus diminish the quantity of fluid of the body, removing simultaneously some of the poisonous matters accumulated in it.

So far theory; and experience, we find, supports it. The concurrent testimony of practical men bears witness to the fact that free purging with bitartrate of potash, or by other members of this group, lessens the fluid in the cellular tissue and cavities of the body, while it often simultaneously removes the coma, convulsions, and other symptoms due to the poisoned blood. This treatment must be adopted with caution; for it must be borne in mind that free purging is weakening.

A brisk purgative frequently promotes free and abundant secretion from the kidneys, either when healthy or diseased; and herein we have, perhaps, further elucidation of the good effects of these remedies in Bright's disease.

One or other members of this group, generally either sulphate of magnesia, or phosphate of soda, is often given as an intestinal evacuant in fever; hence they are reputed to be febrifuge. But their action is due simply to unloading the bowels; for it is well known that constipation augments the preternatural fever heat.

Dr. Armstrong strongly recommended free purgation to the extent of several evacuations in the day to fever patients during the few first days, before exhaustion had set in. In the present day this treatment finds favour—the author thinks justly—with many practical authorities, although Dr. Graves disapproves it. Some consider that free purgation in scarlet fever prevents the severe sore throat, the glandular swellings, discharges from the nose and ears, with many other disagreeable sequelæ.

Purgatives must be given with caution in measles, the bowels being generally irritable, and diarrhœa often present.

The salts of this group most frequently employed are the bitartrate of potash, sulphate of magnesia, and phosphate of soda. This, phosphate well-nigh tasteless, may be given to children in a little broth, without their knowledge.

The sulphates are common ingredients in purgative natural waters, and in this form are frequently taken in small doses



in constipation or torpid liver. In obstinate constipation a draught should be taken once or twice daily. Small doses, often repeated, act with greater certainty than a single large dose; hence when the bowels are tightly locked up, and have resisted the action of a full dose of Epsom salts, it is a good practice to give the same remedy in small and often-repeated quantities.

It must be mentioned that the administration of sulphate of potash must be conducted with some caution, for although usually a safe and mild purgative it has proved in some cases poisonous.

On account of the low diffusion-power of these salts, very little passes into the blood, the greater part, especially when they purge, passing from the system with the fæces. Small doses, if they tarry long in the intestines, ultimately pass into the blood, and are separated by the kidneys. They are reputed to act as diuretics. The tartrates of this group are highly esteemed as excellent diuretics in Bright's disease, and are often employed in doses short of purging. The tartrates and bitartrates are converted into carbonates, partly in the intestines, and partly in the blood. They lessen thus the acidity of the urine, or even render it alkaline. Except in the case of phosphate of soda, the action of these salts on the constituents of the urine, either in health or disease, has not yet been worked out.

As the action of phosphate of soda and of phosphoric acid appears to be nearly identical, we will speak of them conjointly; and for the account of their action we must be indebted to Dr. Parkes' classical work on the urine.

If Böcker's experiments on his own person are to be accepted as conclusive, the effects of these substances are highly singular. Thus, he found that phosphoric acid always carried potash out with it, and that phosphate of soda changed its base, taking potash in its place.

Phosphate of soda, therefore, greatly lessens the quantity of potash in the body, and the acid would greatly diminish the amount of alkali in the blood, but for the singular fact

observed by Böcker, that, while eliminating potash, both phosphoric acid and phosphate of soda caused a retention of chloride of sodium in the blood, to such a degree as actually to heighten the alkalinity of the body.

The effect of phosphate of soda is to lessen the urea in the urine, partly by the retarding effect it exercises on digestion, so limiting the supply of food to the system, and consequently diminishing the quantity of urea separated by the kidneys. But it appears that this diminution is due in part to lessened metamorphosis of tissue, since even when the salt is given on an empty stomach, the urea is still diminished. Phosphoric acid neither lessens the urea, nor affects the digestion.

For further information regarding the influence of these two medicines on the urine, we must refer our readers to Dr. Parkes' work.

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#### NITRATE OF POTASH.

„ SODA.

THESE salts possess a very high diffusion-power, and are freely soluble in water. They lower the temperature of water, an effect very considerably increased if sal ammoniac is mixed with the nitre. This combination used to be applied to the skin as a refrigerator, but however, now it is rarely employed for such a purpose, and is to be especially avoided if the skin is broken, for solutions of the nitrate are very irritating to wounds. Ice is in every way a preferable refrigerator.

The inhalation of the fumes of burnt nitre-paper will sometimes avert a paroxysm of asthma. According to Dr. Hyde Salter this treatment is most effectual in pure uncomplicated asthma. He points out that the paper must not imbibe too much nor too little nitre. If the bibulous paper is too thin, it absorbs insufficient nitre; if too thick, it takes up excess of nitre, and the fumes are too carbonaceous; the paper burning too fast, with a sudden explosive flame. There should be



no brown smoke, but clear white fumes. Red blotting-paper of moderate thickness and loose in texture is best. Dr. Salter gives the following directions for the manufacture of nitre-paper:—Dissolve four ounces of nitre in half a pint of boiling water; pour the liquid into a small waiter, and soak the paper in it; then drain and dry it; cut it into pieces four inches square, and when required, burn one or two of these pieces, or a piece may be burned nightly in the bedroom. The prepared paper must be kept in a dry place. In the Pharmacopœia of the throat hospital, Dr. Morell Mackenzie gives the preparation of three papers of different strength; one made from a solution containing 60 grains, another 40 grains, and the third 30 grains of nitre to an ounce of water. He directs the paper to be cut into pieces 3 inches long and  $\frac{1}{2}$  inch broad, and one to six of these pieces to be used successively at each inhalation. Various substances may be added to the solution, as compound tincture of benzoin, spirits of camphor, oil of cassia, and tincture of sumbul, and appear in some instances to heighten the effect of the nitre. It is a singular circumstance affording a marked example of the "caprice" of asthma, that a paper prepared with nitre only will relieve one patient, yet will utterly fail to relieve another, although a nitre paper prepared in a different manner may be quite successful. It must be borne in mind, therefore, that although one kind of nitre paper has failed, it does not necessarily follow that another sort of nitre paper will not be successful. Sometimes a thin paper fails where a thick one succeeds, or *vice versa*. It appears indeed that very slight differences in the mode of manufacture influence the therapeutic effects. Many quack papers said to contain other substances besides nitre, or besides nitre and chlorate of potash, often succeed admirably.

The crystals of nitre have a cooling, saline taste. They are sometimes sucked in acute inflammation of the throat, but other remedies are preferable.

These salts, it is thought, while undergoing solution in the stomach, will absorb heat, and cool this organ; no

doubt this is the case; but to be of any service in this way a sufficient quantity cannot be taken with safety. Ice or iced water is far more effectual.

The nitrates in large doses inflame the stomach. Even when taken for some time in moderate quantities, they considerably disorder digestion, producing nausea, vomiting, and a coated tongue; consequently, their action must be carefully watched.

How the nitrates excite inflammation of the skin or stomach is not yet explained; for if these tissues are soaked in solutions of these salts, no other change takes place than occurs from the action of simple water.

From their high diffusion-power these salts speedily enter the circulation. Unless indeed large quantities are taken, they pass but a short way along the intestines, and, therefore, do not purge, and indeed, so far as we know at present, exert little or no direct influence on either the small or large intestines.

Much conjecture has been hazarded regarding the action of the nitrates on the blood. It is well known that they prevent the coagulation of the fibrin in blood withdrawn from the body, or, when coagulated, dissolve it. Scherer, however, asserts that they will not dissolve the fibrin of inflammatory blood. These facts have led to the supposition that the nitrates may possess a like influence over fibrin in the circulation, and that they are indicated when this substance is in excess, as in inflammations and acute rheumatism. There is no proof, however, that they possess any such power; and indeed, unless employed in considerable quantities, the nitrates exert very little influence upon fibrin out of the body. Hence it cannot be expected that after its dilution with the fluids of the circulation, a harmless quantity can influence in any way the fibrin of the blood. But, indeed, this notion is no longer tenable; for it has been ascertained that blood withdrawn from the body, both before and after the administration of nitrate of potash, contains in each case the same quantity of fibrin.



These salts are considered to be highly useful in acute rheumatism. It has been supposed that they protect the valves of the heart, or restore them to their natural state when damaged by rheumatism—a supposition founded on a misapprehension of the morbid processes which lead to valvular contraction and incompetency. These structural changes, it was imagined, resulted from the deposition of fibrin on the surface of the valves, and the subsequent contraction of this substance rendered them shrunken and inefficient. This explanation certainly does not hold good, for these changes in the valves are owing to lymph formed in their own substance. Occasionally, it is true, fibrin is deposited on thickened and roughened valves, but even this, as has been just pointed out, can neither be prevented nor removed by these salts.

But, while it must be admitted that these salts do not act in the way supposed, many high authorities consider that they mitigate and shorten an attack of rheumatism. The advocates of nitre administer it in large doses, freely diluted in water, giving as much as half an ounce to an ounce of the salt in the course of the day. It may be given in lemonade or barley-water agreeably sweetened. Under its influence, the urine, it is said, becomes very abundant, when the fever simultaneously declines, and the pains abate. At present there are no observations sufficiently exact to determine this point.

The same discrepancies of opinion prevail regarding the influence of the nitrates on acute inflammation.

Large doses produce pains in the stomach, with vomiting and diarrhœa, great weakness, faintings, loss of consciousness, and death. The same symptoms, in a minor degree, are witnessed when less immoderate quantities are used. The patient is made languid, disinclined to exert either body or mind, and the pulse is feeble and slow.

These salts readily pass from the body through the kidneys with the urine, and in their passage over the urinary organs may irritate and inflame them, and in large doses may even produce bloody urine.

Nitrate of potash has been recommended for incontinence of urine of children.

The nitrates appear to increase temporarily the water and urea of the urine; ultimately, however, these both fall below their natural amount; hence the nitrates are mere eliminators of these substances.

They enjoy with some a very high reputation as diuretics, and in some cases appear to be of considerable service. Their diuretic action is well displayed in lumbago and chronic rheumatism, accompanied by scanty high coloured urine, becoming turbid on cooling. Ten grains of the salt dissolved in water, taken hourly or every two hours, will, in most cases, soon increase the urine, and render it clear and limpid, when the rheumatic pains generally decline.

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#### CHLORATE OF POTASH.

In many of its chemical properties this salt corresponds to the preceding group of nitrates; like them it is endowed with a high diffusion-power, but differs from them in its sparing solubility.

A solution of the chlorate is used as a wash to foul ulcers, which it is said to clean and stimulate; but other remedies are more effective.

This salt appears to increase the flow of the saliva, and, according to Hutchinson and others, to produce ulceration of the mucous membrane of the mouth. It is largely used in various affections of the mouth, and is of signal service in mercurial and simple salivation, in ulcerative stomatitis and aphthæ. It is particularly useful in the ulceration of the edges of the gums. This ulceration, generally limited to one side of the mouth, affects both the upper and lower jaws, also that part of the tongue and cheeks coming in contact with the ulcerated gums. Although not at all dangerous, it is often a



very obstinate complaint, especially with adults. Children are most prone to it. The influence of the chlorate on this form of ulceration is almost magical; in one or two days it cleans the dirty-looking ulceration, and heals it in a day or two more. It is said to cure follicular and phagedenic ulceration like a charm.

Dr. Leonard Sedgwick speaks highly of chlorate of potash in catarrh: he says, it quickly relieves the stuffing of the nose, rawness of the throat and thickness of voice. Taken early and frequently, it will stop many a cold. Eight or ten lozenges should be sucked in the twenty-four hours.

Some assert that the action of chlorate of potash is simply local, and that all its good effects are due to its topical application.

Chlorate of soda is more soluble than chlorate of potash, and is said to be equally serviceable.

It seems to produce but little effect on the stomach, unless taken in considerable quantities, when, like the nitrates, it inflames the mucous membrane, and produces both vomiting and diarrhoea. It is not employed in diseases of the stomach.

It passes readily into the blood; owing to its high diffusion-power; but owing to its slight solubility, a large quantity of this salt cannot be conveyed quickly into this fluid.

Dr. Kent Spender recommends large doses of it in phthisis, and lets the patient drink a concentrated solution, *ad libitum*. This treatment, he says, checks diarrhoea and prolongs life. He recommends also, large doses in the stomatitis of children.

As this salt easily loses its oxygen, it was at one time supposed, that yielding up this element to the blood and tissues, it might promote oxidation; but careful observations have proved conclusively the erroneousness of this view, as the salt can be obtained unaltered from the urine.

It has been recommended in facial neuralgia.

Its influence, if any, on the organs of the body is unknown.

## ALUM.

## DRIED ALUM.

## ACETATE OF ALUMINA.

These salts act mainly as astringents, in virtue, it is supposed, of their capacity to unite with albumen, and coagulate it.

They produce no effect on the entire skin; but when applied to sores, they coagulate the albumen of the pus, mucus, or of the tissues themselves, thus coating the sore with an impermeable layer, and protecting it from the action of the air. Alum, like many other metals, may be used to form this protective coating. These remedies have, however, a further action than that just described; for, as just stated, they act as astringents by combining with and condensing the tissues. The topical application of alum contracts the bloodvessels and lessens the supply of blood to a sore. By constricting the bloodvessels, and by condensing the tissues themselves, the members of this group will depress the vital action of a sore, and so check the secretion of mucus or pus. For this purpose alum is applied dry, or in solution, to relaxed and abundantly secreting sores.

Other astringents in such cases generally succeed better.

Alum solutions may be applied to free-weeping eczematous surfaces, to check profuse discharge, and to bring the eruption into a condition suited for other remedies. Alum, like other astringents, is generally insufficient to heal the eczema.

Owing to their capacity of condensing tissues and coagulating albumen, these substances may be used to control bleeding, and alum has the advantage of being almost always at hand in an emergency. It is applicable only in the milder forms of bleeding. In severe hæmorrhage other treatment is of course required. But to check the bleeding of piles, leech-bites, or slight cuts, alum dusted on the affected part, first wiping it dry, or applied in pretty strong solution, is generally sufficient. Bleeding from the gums may be