enter the blood. This view is supported by the fact that sulphides act in the same way as sulphur. Yet a portion in the form of fine particles, probably passes through the walls of the intestines undissolved, but the quantity so conveyed is undoubtedly very small.

The action of sulphur on the physical or chemical constitution of the blood is at present unknown. It has been said to produce salivation occasionally in persons who had previously taken mercury. The opinion is general that it excites in healthy persons an increased secretion from the mucous membrane of the air passages, although Buchheim denies this. Graves, and other authorities, strongly recommended sulphur in doses of from five to ten grains, repeated three or four times a day, in severe chronic bronchitis, with abundant discharge, especially when accompanied by constitutional debility. It is said to lesson the secretion, and to render its expulsion easier.

It increases, so it is said, both the frequency and force of the heart's contractions, and promotes the flow of perspiration; but these assertions both greatly need confirmation.

It is asserted that the pain of chronic rheumatism and sciatica may often be relieved by applying sulphur to the skin over the seat of pain; but, as in applying the sulphur it is generally recommended to envelope the affected limbs in soft flannel, it is difficult to discriminate to what extent relief is attributable to the sulphur or to the flannel.

Chronic eruptions of the skin of the dartrous family, as acne, psoriasis, impetigo, and eczema, are said to be benefited by the internal administration of this remedy.

Most of the sulphur taken into the stomach escapes with the fæces; while part of that which enters the blood, becoming oxidized, appears in the urine as a sulphate or one of the lower oxides of sulphur. The sulphuretted hydrogen, from its great volatility, escapes in some measure by the lungs and skin, and occasionally with the milk, and by the urine.

Some aver that a portion of the ingested sulphur passes

through the system, and is separated by the kidneys in the uncombined state. Sulphur produces no change in the quantity of the constituents of the urine, with the exception of the sulphur compounds, which it augments.

Sulphur may be conveniently administered in milk.

SULPHIDE OF POTASSIUM.
„ SODIUM.
„ AMMONIUM.
„ CALCIUM.

Many natural waters contain one or more of these substances. Sulphurous waters are found at Harrogate, Barèges, etc. They have a characteristic disagreeable odour like that of rotten eggs.

The three first substances are freely soluble in water; the last is very scantily soluble.

Strong solutions of these soluble salts excite active inflammation of the skin; weak solutions stimulate the skin, augment its supply of blood, and increase perspiration.

Baths containing these substances prove very useful in the chronic forms of some skin diseases, as psoriasis, eczema, and lichen; likewise in chronic rheumatism, chronic gout, and chronic lead poisoning. In these diseases the natural sulphurous waters are largely used as baths. Care must be taken not to employ them till the subsidence of the acute stage of eczema and psoriasis, otherwise they will much aggravate the rash. Obstinate forms of these skin diseases, rebellious to other treatment, often yield to these baths.

The good results of sulphurous baths, in cases of chronic lead poisoning, has been explained by the assumption that they eliminate the lead with the sweat. It is said that under the use of these baths, the skin becomes covered with innumerable black points of sulphide of lead; but to this it may be objected that the lead thus blackened is deposited

on the skin from without, not eliminated with the perspiration. This objection, however, is met by the assertion, that if a lead-poisoned patient carefully abstains from all contact with lead, yet, as often as he uses a sulphurous bath, his body still becomes blackened, time after time. It is difficult, on theoretical grounds, to understand how this metal can be eliminated with the perspiration; but for the further consideration of this point we must refer our readers to the section on lead.

The use of these baths at a very high temperature will often restore much of their suppleness to joints much distorted and stiffened by chronic rheumatoid arthritis. Yet as other baths of like temperature appear to do equal good, it is difficult to say whether the sulphides play any part in the beneficial results, although it is true there is a wide-spread belief in their efficacy.

A very efficient application to cure itch is made in the following way:—Boil one part of quicklime with two of sublimed sulphur in ten parts of water, until the sulphur and lime combine. The solution should be allowed to stand, and should then be decanted. Metal vessels should not be used in its preparation. The liquid solution is to be painted over the body after it has been well cleaned by a bath and wiped quite dry. This application is rather irritating, and sometimes produces roughness of the skin, which may continue some time after treatment. Dr. Bourguignon, who introduced this plan, claims to cure the patient by it in half an hour.

Taken into the stomach, the sulphides are in part decomposed by the acids they encounter there, and disagreeable eructations of sulphuretted hydrogen gas are often given off.

The sulphides in small doses excite a sensation of warmth at the epigastrium, but in excessive doses they produce active inflammation in the digestive canal, with its customary symptoms.

Small doses act as slight irritants to the intestines, and determine slight relaxation of the bowels. It is supposed that sulphur acts as a purgative, by its conversion into a sulphide through the agency of the alkali of the bile, (vide p. 65.)

These substances are employed in cases of poisoning by certain metallic salts. They precipitate the metal in the form of an insoluble sulphide, and so render it harmless. There is, however, danger of giving the sulphide in too large a quantity, when in its turn it would itself excite inflammation of the stomach; wherefore sulphide of iron is often recommended as in most instances preferable to the alkaline sulphides.

Their effect on the blood after absorption into that fluid is at present unascertained.

Persons who habitually breathe air impregnated with sulphuretted hydrogen certainly suffer from great anæmia, and the gas appears to cause much depression of the functions of the body.

When taken by the stomach in over-doses, they produce insensibility and speedy death. It has been doubted, however, whether this result is not due to the effect of these substances on the stomach itself, and not to their absorption into the blood and conveyance to the nervous centres; for it appears from Bernard's experiments, that sulphuretted hydrogen injected into a vein is so quickly eliminated by the lungs, that the arterial blood is uncontaminated by this gas, and consequently the nervous centres cannot be affected by it.

These substances may be very usefully employed in certain troublesome diseases, and often yield very striking results.

Thus, when taken by the stomach, they possess decided influence over the suppurative process.

The influence of the group on the suppurative process is easily made manifest. Thus when sulphide of potassium or calcium is administered, a thin, watery, unhealthy discharge from a sore becomes at first more abundant, afterwards diminishing, and throughout continues thicker and healthier, possessing indeed the characters of "laudable" pus. The condition of the sore improves correspondingly, and its healing is promoted.

The sulphides appear often to arrest suppuration. Thus in inflammation threatening to end in suppuration they reduce the inflammation, and avert the formation of pus. This effect

is manifested when sulphur compounds are employed locally in acne indurata; but further on I shall speak more in detail concerning their employment in this eruption. The influence of this group is still more conspicuous after the formation of pus. They then hasten maturation considerably, whilst at the same time they diminish and circumscribe the inflammation. They promote the passage of the pus to the surface and the evacuation of the abscess. Their efficacy may be frequently demonstrated in cases of the following kind. An unhealthy child, from six to twelve months old, suffers from a slight sore-throat, occurring perhaps in scarlet fever or measles. The sore throat produces considerable enlargement of the glands behind the angle of the jaw, and the swelling, of stony-hardness, may be sufficiently large to interfere with swallowing and to push the head on one side. Suppuration takes place, but is very deep-seated, and for a long time there is neither redness of the skin nor fluctuation, and the pus very slowly makes its way to the surface, so that a fortnight, three weeks, or even a month may elapse before the abscess bursts, or is fit to be opened, when a deep hole is left, with considerable induration around it. The pain and constitutional disturbance are so great that the child sometimes dies; and even if this termination is averted, the deep discharging hole heals very slowly owing to the indurated and unhealthy state of the adjacent tissues. In such a case if a tenth of a grain of sulphide of calcium, mixed with a grain of sugar of milk, is given every hour or two, the results are most striking. The swelling becomes smaller, the pus reaches the surface in four or five days, and when it is evacuated leaves a benign wound which quickly heals. The effects of these remedies are equally conspicuous in mammary abscesses, although in rare instances they appear temporarily to increase the pain—a remark which seems sometimes to hold good with respect to boils. But as a rule the pain is speedily mitigated. Singular to say, I have found these remedies of much less use in forwarding the maturation and expulsion of pus in indolent buboes, but in such cases my experience of their use has been but small.

It may be urged that it is difficult to imagine how these remedies can produce effects so different and apparently opposite as the dispersion of inflammation in one case and the expulsion of pus in another; but poultices and hot fomentations certainly possess the property both of subduing inflammation and of preventing suppuration, and in other cases of hastening considerably the evacuation of pus.

In boils and carbuncles these remedies yield excellent results. A tenth of a grain of sulphide of calcium, given every two or three hours, generally prevents the formation of fresh boils, while it lessens the inflammation and reduces the area of the existing boils, and quickly liquefies the core, so that its separation is much more speedy, thus considerably curtailing the course of the boil. Where the skin is not yet broken, and the slow-separating core therefore not yet exposed, the sulphides often convert the boil into an abscess, so that on bursting, pus is freely discharged and the wound at once heals, or if the centre of the hardened swollen tissues is not yet dead, the pustule dries up, the inflammation subsides and a hard knot is left which disappears in a few days without the formation of a core and without any discharge. These remedies meanwhile improve the general health, removing that debility and malaise ordinarily so markedly associated with these eruptions. In some cases, however, as in the deep-seated boils and abscesses of diabetes, they are powerless. In carbuncles the sulphides will generally be found equally serviceable, melting, as it were, the core into healthy pus, and so quickly expelling the dead and otherwise slow-separating tissue. In abscesses and carbuncles it is useful to apply belladonna over the inflamed part to reduce inflammation and allay pain. The skin should be thickly smeared with equal parts of belladonna and glycerine, and over this a poultice should be applied, renewing the smearing each time the poultice is changed. Poultices, however, being liable to bring out a fresh crop of boils, it is well to smear belladonna ointment some distance round but not over the boil, and then to apply a poultice, the greasy application thus pro-

tecting the neighbouring tissues. Or, still better, apply a belladonna or opium plaster on leather, with a hole the size of the boil, around the swelling, and through the opening smear glycerine and belladonna, covering all with a small poultice. The leather plaster efficiently protects the surrounding skin and averts the production of fresh boils. I have thought it worth while to mention these useful plans of protecting the boil; but it is scarcely necessary to observe that whilst investigating the effects of sulphides I have employed them alone, or at most sometimes using only a poultice.

The good effects of sulphides are conspicuous in certain scrofulous sores not uncommonly seen in children. Scrofulous children during the first few months are sometimes subject to indolent abscesses in the cellular tissue which run a very slow indolent course. At first only small hard substances are observable, no larger than a pea, under the skin, which is of natural colour, and movable over them. The small substances next suppurate and gradually enlarge, the skin becomes adherent to them, and changes in colour to red or even violet, while sometimes in their neighbourhood the smaller vessels become enlarged and even varicose. They may grow to the size of a florin, and when maturated feel soft and boggy. After a time a small circular opening appears, not larger perhaps than a pin's head, through which escapes a thin unhealthy pus. If deep-seated, as on the buttocks, or in fat children, there may be very little or no discoloration of the skin. The chief noticeable character then is the small sharply-cut opening, as if a piece had been punched out. These formations follow one another, and may continue to distress the child for months or years. In mild cases a few only may form, whilst in severe cases there may be at one time ten or a dozen in different stages of development. When they heal they leave a white, sharply defined, but not deeply depressed scar. On the administration every hour or two of a tenth or twentieth of a grain of sulphide of calcium the following effects occur:—New formations seldom

appear, although for months or years the child may have been infested with them. Many of the abscesses, especially in a very early stage of development, dry up and disperse, others generally speedily come forward and discharge their contents, the pus being laudable, instead of thin and unhealthy. The abscesses already in an open state improve, their pus becoming healthier, and the wounds healing speedily.

In some cases, in addition to these subcutaneous formations, the bones also become affected. The phalangeal bones of the hand are most frequently attacked, but not uncommonly the metacarpal, and more rarely the metatarsal. Where the phalangeal bones are affected, one or several of the fingers become nodose. For a long time the skin remains pale and freely movable, but after a time suppuration ensues, when the swelling increases, the skin becomes red and painful, and, after a time slowly softens at one point, remaining boggy for a considerable time before the abscess opens naturally. Then generally a little bone separates, or in bad cases the whole of the shaft comes away, leaving the epiphyses behind. When an opportunity occurs to examine these bones before suppuration sets in, the shaft is found considerably enlarged, very pale, and the cancellous structure infiltrated with a straw-coloured firm substance, whilst the epiphyses and their cartilages are healthy. Even an affection so severe as this may be considerably benefited by sulphides. Thus before suppuration has set in, or whilst it has made little way, they often remove the swelling, though large doses may be required. After much suppuration, their good effects depend in a great measure on the amount of the disease of the bone. If the whole shaft becomes necrosed, of course the sore will not heal till this has been got rid of; but suppuration often occurs and yet but little, or perhaps none, of the bone dies. In such a case the sulphides hasten the expulsion of the pus, and if before they are employed the skin is already broken, they improve the character of the wound and the discharge, and the sore heals, leaving a sunken scar

adherent to the bone, whilst the finger slowly assumes its natural proportions. Large indolent abscesses may form on the back of the hands or feet. These are similarly affected by the sulphides. Whilst these remedies are thus influencing locally these strumous formations and abscesses, the child's health greatly improves, although failing previously, in spite, perhaps, of the administration of cod-liver oil and steel wine. That the improvement is due to the sulphide is shown by the fact that the amendment occurs where only this drug is administered. On prematurely discontinuing the sulphide, fresh formations are apt to appear, especially on the occurrence even of a slight illness; indeed, a severe illness will often excite a few fresh abscesses, in spite of the sulphides.

The sulphides appear to me to exercise a very beneficial influence in suppurating scrofulous glands in the neck. Here again they hasten the elimination of the pus, and subsequently the cheesy scrofulous matter. After the abscesses have burst, and continued slowly discharging a scanty, unhealthy pus, and when the edges of the sores have become much thickened and indurated, these remedies render the discharge more abundant, thick, creamy, and healthy, considerably hasten the evacuation of the scrofulous matter, which prevents the healing of the wound, and at the same time soften the round indurated edges, so that the sore heals much more speedily. If small doses appear to affect these sores but little, larger doses, as half a grain or a grain, should be given several times a day, or even every two hours. I need hardly say that to compass the results described, the treatment must be continued several weeks, for it is vain to expect them to occur in a few days, when the sores have been discharging perhaps for months or even years.

The topical effect of sulphur ointment, or of an ointment of the hypochloride of sulphur, or, still better, of the iodide of sulphur of the Pharmacopœia, is very marked on acne indurata and acne rosacea. Here, again, the effects are twofold, and even opposite, according to the stage of the eruption. If applied at the very commencement of the eruption, as soon as the little hard knot is felt under the skin, further development is arrested, and the hardness speedily disappears. For instance, if smeared over the hardness just before going to bed, in the morning scarcely any induration will be felt, though after a time, perhaps from exercise, or the irritation from washing, much of the hardness may return, to be again removed by a renewed application of the ointment, so that in two or at most three days a papula that threatened to become of considerable size may be completely dispersed. When, however, the nodule has advanced further, and suppuration has set in, then the effects of the ointment are much like those of sulphides, administered internally, on boils. The ointment hastens maturation, limits the swelling and hardness, and thus considerably curtails the duration of the eruption. Nay, further, if rubbed over the skin it appears to check the formation of the acne spots. If rubbed over the nose and neighbouring parts of the face in acne rosacea its effects are often striking. Not only does it act as in acne indurata, but the hardened, swollen tissues become softened and reduced to a more natural state. I have found the iodide of sulphur useful likewise in bromic acne, reducing the eruption, or at least, lessening considerably the size of each spot. In acne the ointment should be thickly smeared over the eruption night and morning.

Anyone who gives the sulphides a fair trial in the foregoing cases will, I feel confident, have reason to be gratified with the result.

A formula adopted by the author is a mixture of much the same strength as the Harrogate waters. Thus, he directs a grain of the sulphide of calcium (the member of this group which he always employs) to be mixed with half a pint of water, and of this a child should take a teaspoonful hourly. It must be carefully borne in mind that the salt rapidly becomes oxidized and changed into a sulphate, so that in a very short time none of the sulphide remains; consequently it is essential that the medicine should be compounded daily. It is still more convenient to give the sulphide in powder, in doses

for an adult of one-tenth to one-half of a grain mixed with sugar of milk, taken hourly, or every second or third hour as the case may require. Four to six powders daily is usually sufficient; a child should take one-tenth or one-twentieth of a grain.

It may not be amiss to mention that, in employing these agents in baths, porcelain or wooden vessels must be used, as the sulphides attack and discolour most metals. These baths emit an offensive and powerful stench.

CHLORINE GAS.
CHLORINE WATER.
CHLORINATED SODA } **and their solutions.**
CHLORINATED LIME }

These substances are used as deodorizers, disinfectants, and antiseptics.

Whatever power they possess in these respects, is due either to chlorine or to hypochlorous acid.

Chlorine gas possessing very strong chemical affinities, acts probably by seizing with avidity the hydrogen from many organic and inorganic substances, and thus breaks up their composition.

Hypochlorous acid, which is given off abundantly by the two last-mentioned members of the group, is an active oxidizing agent. It yields up its oxygen readily, and so destroys many substances: at the same time chlorine gas is set free, which again acts in the way just described.

These substances are thus deodorizers, destroying the ammonias, sulphuretted hydrogen, and sulphides of ammonium, on which the disagreeable odours of sick rooms depend.

Chlorine, from its gaseous state, is admirably suited as a deodorizer, as it penetrates every cranny of the room, searching out and destroying noxious and offensive gases.

While these substances may be conveniently and profitably used as deodorizers, it must always be borne in mind that it is preferable to prevent bad smells by free ventilation, and that chlorine gas itself has an odour very disagreeable to most people. If these deodorizers are often required in a sick room, it is a sure sign that ventilation is defective, and probably that the nurse is careless.

These substances are employed as disinfectants, but the evidence in favour of their possessing such a property, although very generally held to be sufficient, is inconclusive.

When treated with these substances, some infecting matters, it is true, lose their power to propagate disease; but it is impossible to subject either persons or things to such destructive action as was found to be required in these experiments. It is not, however, the less desirable to fumigate rooms lately occupied by sick people, as the process can do no harm, and is probably highly salutary.

To disinfect unoccupied rooms, the air must be very strongly impregnated with chlorine. M. Regnault recommends the following plan:—Sew one pound of chloride of lime loosely in a strong canvas bag and put it into a mixture composed of a pint and a half of commercial hydrochloric acid with four and a half pints of water. The room is then closed and the chimney outlet blocked. After twenty-four hours the room should be freely ventilated for forty-eight hours.

Besides destroying many offensive gases, these substances prevent decomposition; hence they are useful as washes or injections to prevent the decomposition of the pus of sores or cavities of the body. Sloughing, foul-smelling sores should be washed with solutions of these or similarly acting substances. Chlorine compounds, being slightly stimulating, improve the condition of indolent sores. After an operation, it sometimes happens that hollows are left, in which pus collects and putrefies. The fetid gas and putrid pus becoming absorbed, poison the system. This may be avoided by washing out the cavities several times daily with a weak chlorine