and who was the most seriously affected of those at the vat. He was a robust, powerful man, and had been engaged at this particular work for sixteen years. If there can be such a thing as immunity to AsH_3 , he should have afforded an example. He had been at work there all the morning, and left his work at 2 P.M. At 2.30 he felt sick, nauseated, and depressed, with a hot, burning pain from his throat to his stomach, and with an intense thirst. This was soon followed by violent vomiting, at first of food, then of everything as soon as swallowed, even iced water. This again was followed by an equally severe diarrhoea; the discharges were at first loose faecal matter, then rice-watery, and finally contained blood. Added to this there was hæmoglobinuria and a rapidly developing jaundice, which within twenty-four hours assumed an intense coppery hue. As is usual in these cases, and without any knowledge of the surrounding circumstances and the obvious cause, a diagnosis of cholera would have been pardonable within the first twelve hours. The whole effect was that of an irritant poison taken by the mouth, being evidence that the arsenic in the gaseous state was absorbed by the blood direct from the lungs, and in its passage through the walls of the stomach, was separated there and acting directly. Doubtless also some may have been swallowed in the saliva. The feeling of depression deepened into extreme prostration, the features were sunk and cyanosed, the pulse thready, and the voice lost. These severe symptoms lasted with gradually diminishing severity for several days. The feeling of prostration, the anæmia, the almost pale green colour of the skin which supervened on the disappearance of the jaundice, lasted for several weeks longer, and it was only after the lapse of five weeks that he was able to return to work.

In the one fatal case the symptoms showed no variation from the above, excepting that there was no tendency to recovery. Towards the close there was suppression of urine, and after thirty-six hours of complete unconsciousness, he died on the seventh day.

In all of these cases there was jaundice. In 8 of them it was intense. In 2 only could it be described as slight. In 9 also there was hæmaturia. Intense thirst and a burning pain in the chest characterised the onset and earlier stages of all the cases. Diarrhoea was troublesome in 5, and all the cases, with the single exception referred to, suffered from profound anæmia in the later stages of the disease. The effect on the nervous system was more or less severe in 9. In 6 of these the prostration and collapse of the earlier stage was very severe.

One man who was engaged with these 10, and who was on the platform nearly the whole time, escaped without any symptoms whatever, and the varying degrees in which they were affected would seem to indicate that individual susceptibility played an important part. The man who died could not have been described before this as a good life. He had been a heavy drinker, and the effects of chronic alcoholism no doubt militated against any tendency to recovery.

Notification.

The medical profession generally, except in districts where industrial lead poisoning is frequent, does not appear to be aware that by Section 29 of the Factory and Workshop Act, 1895, every medical practitioner attending on or called in to visit a patient whom he believes to be suffering from lead poisoning, phosphorous poisoning, arsenic poisoning, anthrax, contracted in any factory or workshop, is required, under penalty, to notify the case forthwith to the Chief Inspector of Factories, Home Office, unless it has been so notified, and that he is entitled to a fee of 2s. 6d. for so doing, and that this requirement was extended by order of the Secretary of State in May, 1899, to mercurial poisoning similarly contracted.

REFERENCE

¹Medical Chronicle, Manchester, 1895.

A SANATORIUM FOR LILLE.—La Ligue du Nord contre la Tuberculose is collecting funds for the erection of a sanatorium for Lille, where it is estimated there are every year 6,000 working people affected with tuberculosis, and 1,200 persons die annually of the disease. The sanatorium will have 100 beds, and should receive from 300 to 400 patients in the year.

THE ELECTROLYTIC DEPOSIT OF SULPHUR FROM THE HARROGATE SULPHUR WATERS AS A THERAPEUTIC AGENT.

By FRANCIS WILLIAM SMITH, M.D. ABERD.,
Harrogate.

DURING "the season" of 1900, at Harrogate, I treated many patients with electricity (mostly the constant current) who were sent to me by physicians in London and other places. The electricity was passed through the Beckwith Harrogate water, at a temperature of 99° F., at the Royal Baths. The analysis of this water, by Mr. Hayton Davis, F.C.S., is as follows:

	Grains per Gallon.
Calcium sulphate	0.580
Calcium carbonate	5.947
Magnesium carbonate	4.222
Sodium carbonate	16.147
Sodium chloride	3.374
Potassium chloride	0.610
Lithium chloride	Trace.
Sodium sulphide	1.700
Silica	0.530

33.339

It will be noted that the water contains a large amount of alkaline carbonates and a considerable amount of sodium sulphide, while the chlorides are small in quantity. This water is largely used for bathing in skin affections at the Royal Baths.

On the skin of many of the patients treated by electricity in this sulphur water I observed a yellow deposit, which looked and smelt like sulphur. This was especially so in the case of Mr. D. (Leamington) and Mr. G. (Manchester). In Mr. D.'s case the skin was quite covered with a yellow powder after the first few baths. He had suffered from acute gouty eczema from September, 1899, till March, 1900, more or less; and when he consulted me in August he was low and weak, with large patches of eczema in different parts of his body, especially on the feet, legs, and arms. I ordered him electricity in the Beckwith sulphur water, and the improvement was rapid. It was towards the close of his "cure" that I was struck with the quantity of what looked like sulphur on his skin, and I thought that electricity had brought this about, because I had never seen any yellow deposits upon the skin after an ordinary hot sulphur bath. Mr. D., in reply to questions, wrote to me on December 12th, 1900, the following answers.

1. The sulphur deposit appeared on my skin very soon after my first (electric) bath, and was always there afterwards.
2. The sulphur was by no means specially deposited on the parts where the ointment had been previously applied.
3. There was a smell of sulphur on my body at all the times when in Harrogate.

In the case of Mr. G., the sulphur was deposited on his skin in the same way, and he got rapidly well, and remains so.

These facts led me to make the following experiment: I attached wires leading to the positive and negative terminals of the main town electrical trunk, and allowed a constant current of 30 milliampères to pass through the Beckwith sulphur water for half an hour, with the result that sulphur was deposited on the positive platinum foil.

Not trusting to my own judgment, I called in the assistance of Professor Smithells, Professor of Chemistry at the Yorkshire College, Leeds; and he, with his assistant, Mr. H. M. Dawson, B.Sc., Ph.D., examined the behaviour of the Beckwith water, and also of the water of the Old Sulphur Well at Harrogate, in the presence of electricity.

Professor Smithells's report, received on December 31st, 1900, is as follows:

Electrolytic theory would lead one to expect that when an electric current is passed through the Harrogate sulphur waters, sulphur would be liberated at the positive pole by direct electrolysis of the sulphides and of the dissolved sulphuretted hydrogen. The electrolysis of the chlorides which exist in the waters, leading primarily to the liberation of chlorine at the positive pole, would liberate sulphur by secondary action from any sulphides and sulphuretted hydrogen present in the water. There is thus every reason to anticipate that if the human body were immersed in the waters, and connected to the positive pole, the negative plate being simply suspended in the water, the whole immersed surface of the body would become the seat of the production and deposition of sulphur. Experiments with platinum electrodes fully bear out this anticipation. Both in the Beckwith water and the water from the Old

Sulphur Well, a deposition of sulphur occurs at the positive pole. If therefore it is a desideratum to have sulphur in a nascent state on the skin, the arrangement proposed seems exceeding well calculated to effect the object in view, and to be much more efficient than simple immersion of the body in sulphur waters. I have of course no title to discuss the efficacy of the process from a therapeutic standpoint.

Professor Smithells forwarded at the same time the following supplementary report from Dr. Dawson:

The rationale of the electrolytic process by which sulphur is separated at the positive pole on electrolysis of the Harrogate sulphur waters is probably as follows. It is probable that part of the sulphur is present in the waters as free sulphuretted hydrogen, the remainder being present in the form of alkaline sulphides. (This of course leaves out of consideration the sulphur present in the form of sulphates.) The water from the Old Sulphur Well is not an alkaline water, and it would appear probable that a very considerable quantity of the sulphur is present as H_2S . The Beckwith water being an alkaline water a smaller proportion of the sulphuretted hydrogen is free; alkaline sulphides exist probably in the solution.

On passing a current through the water from the Old Sulphur Well, which contains large quantities of dissolved salts, especially sodium chloride, the electricity will be carried mainly by the ions of the latter salt. The discharged Cl ion reacts with the sulphuretted hydrogen in the solution according to

The other negative ions, for example the sulphuric acid and carbonic acid ions which carry a part of the electricity have the same effect as the chlorine ions. The discharged ions react with water producing nascent oxygen:

and this nascent oxygen then reacts with the dissolved sulphuretted hydrogen or alkaline sulphide.

If the Beckwith water contains the greater quantity of its sulphur combined as sulphide or rather as hydrosulphide, for the sulphur ion is scarcely capable of existence in aqueous solution, its electro-affinity being so small, by taking up hydrogen with the production of the sulphhydrogen ion its electro-affinity is increased. These sulphhydrogen ions may carry part of the current, in which case they react at the positive electrode on each other with the production of free sulphur according to

The effect of the current is therefore in all cases the production of free sulphur at the positive electrode.

With regard to the current density which is most suitable for the production of free sulphur at the positive pole, it may be said that the effect will be greatest with small anode density as far as the production of sulphur from the action of discharged chlorine, sulphuric acid, and carbonic acid ions is concerned. Large current density at the anode would lead to the production chiefly of molecular chlorine and molecular oxygen.

On the other hand, large current density at the anode would be favourable to the separation of sulphur by the last process, namely, the interaction of SH ions. It is highly probable that the production of S by the action of the discharged Cl , SO_4 , and CO_3 ions greatly preponderates, so that a low current density is favourable.

The strength of the current should probably not exceed 20 to 30 milliampères. The current density at the cathode is of no essential importance.

On account of its larger quantity of sulphur and its better-conducting power, the water of the Old Sulphur Well is perhaps preferable to the Beckwith water. This is, perhaps, probably more than counterbalanced by the fact of the latter water being alkaline, which appears to be of great importance.

With regard to the current density which is most suitable for the production of free sulphur at the positive pole, I found that the effect was greatest with small anode density, and Dr. Dawson confirms this, stating that the strength of the current should probably not exceed 20 to 30 milliampères.

The action of an electric current in the manner such as is used in the Harrogate Beckwith Bath would probably be the only one which would give the exact conditions necessary to actually release the nascent sulphur on the exact surface on the patient's skin where it is required.

In the case of certain patients the sulphur is not deposited so visibly as on others; why, I cannot say.

Ordinary sulphur baths are used with benefit at Harrogate in gout and rheumatism. I am, however, convinced that the benefit is much greater and quicker when electricity is used in the sulphur water. I am also persuaded that peripheral neuritis, neuralgia, and certain forms of paralysis do better when electricity is applied in sulphur water than in ordinary water or in blankets. I have come to this conclusion from observations upon seven or eight patients treated daily by both methods through the Harrogate "season."

I also believe that nascent sulphur enters the skin by means of the constant current when applied in sulphur water.

CONCLUSIONS.

1. That nascent sulphur is deposited in the Harrogate sulphur water by electricity at the positive pole.
2. That the same thing takes place on the skin of patients in a sulphur electric bath under similar circumstances.
3. That in addition to the remedial influence of nascent sulphur, electricity stimulates the peripheral nerves all over the body in a sulphur bath, and thus renders the action of sulphur more rapid and more efficacious in skin and gouty affections.

AMPUTATION MORTALITY AT THE LONDON TEMPERANCE HOSPITAL.

By W. J. COLLINS, M.S., M.D., B.Sc.LOND., F.R.C.S.,
Surgeon to the London Temperance Hospital, and to the Royal Eye Hospital.

THE following table, for which I am indebted to the Surgical Registrars, Messrs. Griffith and Hosford, includes all amputations performed by me at the London Temperance Hospital since I succeeded Mr. Pearce Gould as Surgeon to the Hospital on July 1st, 1888, up to December 31st, 1900.

Amputation.	For Disease.		For Accident.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
At hip ...	5	1	0	0	5	1
Of thigh ...	14	1	3	0	17	1
Of leg ...	7	0	7	0	14	0
Of foot ...	7	0	0	0	7	0
Of toes ...	16	0	2	0	18	0
Of arm ...	1	0	2	0	3	0
Of forearm ...	3	0	1	0	4	0
Of hand ...	0	0	1	0	1	0
Of fingers ...	26	0	12	0	38	0
Totals ...	79	2	28	0	107	2

This gives a total of 107 cases, with 2 deaths. The fatal case of amputation at the hip was in a little girl aged 8, in the last stage of morbus coxæ, greatly emaciated, and suffering from advanced amyloid degeneration. The other fatal case was that of a man aged 49, who *post mortem* was found to have sarcoma of the liver and in the pelvis, secondary to sarcoma in the ham, for which amputation of the thigh was performed. This latter was the only case for whom alcohol in any form was ordered.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

ACUTE CASE OF PITYRIASIS RUBRA (DERMATITIS EXFOLIATIVA GENERALIS): RAPID RECOVERY.

C., AGED 53, male, had been in poor health for some time, being especially "troubled with his breath." He was a tall stout man, rather flabby, with the well-marked dilated facial capillaries and the slight oedema about the lower extremities characteristic of a feebly-acting heart. He had a mitral systolic murmur. His occupation was indoors, and his habits were fairly abstemious. After a slight cold early in July, 1900, his breathing became suddenly much worse, and the oedema of the feet spread up to the knees. The abdomen showed signs of corresponding passive effusion. Orthopnoea rapidly developed, and his urine contained a trace of albumen. His pulse was irregular and intermittent, and his temperature normal.

Rest was enjoined and light nutritious food administered, alcohol entirely stopped, and the following prescribed: $\mathcal{R}$ Ammon. carb., gr. v; ammon. benz.; sodi. benz. $\mathfrak{ss}$ gr. x; tinct. digitalis, $\mathfrak{mij}$; tinct. jaborandi, $\mathfrak{mxx}$; decoe. scoparii ad $\mathfrak{zj}$; m. T. d. s. This mixture was gone on with for three weeks, and at the end of that time the patient had quite recovered from the orthopnoea. All swelling had gone,