

unite behind the lens of the latter and form on the fundus a circle of dispersion $c d$; from any points of this circle, such as from $a b$, pencils of rays will be reflected and emerge from the eye parallel to the lines (dotted) through the optical centre; they are, however, converged by L , and brought to their foci at $b' a'$, at which place, then, there will be an inverted, magnified, and distinct image of $a b$ (the interrupted lines indicate the course of rays from a , and similar ones may be traced from b). By making an opening in the mirror at E , and placing our eye there, and accommodating our vision for the distance $E b' a'$, we readily become cognizant of the image. As is evident, this is an *aërial image situate between the observer and the convex lens*; it is also actually *inverted* and enlarged. If it be desired to obtain an enlargement of this image, it may be effected by placing behind the mirror another convex lens, but of a longer focal distance than L ; or we may primarily produce a large image of $a b$ by having L of a long focal distance, such as four inches, for such a lens will be of a lower converging capacity than one of two inches; and hence the image will be larger. By the above process we illumine the greater part of the fundus, and by using a convex lens of very short focus we obtain a very large field, *i.e.*, a view of nearly the whole illuminated portion, but the details are very small; by using a lens of longer focus the field of vision is curtailed, but the parts much magnified: thus, for instance, if we employ a lens of two-inch focus we obtain an image of the entire fundus, whereas if we use one of four we merely obtain an image of the optic nerve entrance. This mode of examining has been termed the *indirect*, or the examination of the reversed aërial image, to distinguish it from another, styled the *direct*—in which a *virtual erect* image of the fundus is seen.

ART. X.—*On the Use of Sulphite of Magnesia in the Treatment of Zymotic Diseases.* By H. R. DE RICCI.

IT is now upwards of two years since I last published, in the pages of this Journal, the results of my investigations in the treatment and prophylaxis of zymotic diseases by the administration of the alkaline and earthy sulphites, and especially by the sulphite of magnesia; but, although my pen has so long been silent on this highly interesting and most important branch of therapeutics, it is not because I

have relaxed from my labours, for I still have diligently pursued my investigations, administering the sulphites on every occasion in which I thought they would be productive of good, and carefully noting the effects. I have also collected, from different sources, the results of sulphitic treatment, both in Europe and in other parts of the world, and in the hope that this information may eventually be of service to medical science, I beg to lay it before my professional brethren.

I regret to find, upon enquiry, that up to this date the treatment by sulphitic salts has found but few disciples in these islands, a fact much to be regretted, as those few who have tried this remedy in appropriate cases have almost invariably been satisfied with the results. No doubt the treatment has been in many cases unsuccessful, often in consequence of the administration of wrong preparations; and, besides, I do not presume to assert that every case of pyemia, puerperal fever, scarlatina, or other zymotic affection, will be cured by the administration of sulphite of magnesia, but I do assert that a great majority of such cases will recover under this treatment, if the remedy be only taken sufficiently early. I say, if taken sufficiently early, and it will be easily understood why I insist on early treatment, because, if in a case of zymotic disease, of whatever species, the treatment is delayed until the blood is so loaded with poison, so deteriorated in quality, as to be no longer able to perform its normal functions; such a case, if treated by sulphites, is no more likely to recover than if treated on any other principle, or without any principle at all, or let alone to the *vis medicatrix naturæ*; the blood being thoroughly poisoned is incapable of maintaining life; and though the sulphites may be administered, and though they may arrest the further propagation of the poison by neutralizing or by rendering the blood incapable of being infected, still they can never restore to life the defunct blood corpuscles; and if, in a given case, the destruction of these most important organisms reaches an amount such as to leave an insufficient quantity of healthy blood corpuscles to carry on the normal functions of organic life, death must be the result. If, for instance, we assume that at least 50 per 100 of normal blood corpuscles, is the minimum quantity which will enable an animal to exist, and that in a given case of zymotic disease the destruction of these corpuscles reaches 60 per 100, such a case, even though saturated with sulphites, would of necessity end fatally, because, although the existing poison would be neutralized, and its further increase put a stop to, yet the

amount of healthy blood remaining would be insufficient for maintaining life, and death would be the inevitable result. Hence the importance of early treatment, of early administration of sulphites, while still a large portion of the blood is in a healthy state, and capable not only of carrying on life, but also sufficiently strong to throw off the poison, now rendered inert by the presence of the sulphurous acid. To the tardy administration of the sulphites I, therefore, in part ascribe their want of success in many cases in which they have been tried in these countries. Another cause of failure I attribute to the administration of *hyposulphite of soda*—instead of the sulphites, and especially the sulphite of magnesia—which, on enquiry, I find to have been the salt most frequently employed. I have long ceased to employ the hyposulphite of soda, and for the last two years have invariably administered the sulphite of magnesia; and this for three reasons:—Firstly, because when administering hyposulphite of soda the greater portion of the acid becomes oxydized, during its progress through the animal economy, and appears in the urine as a sulphate; Secondly, because it is a salt of hyposulphurous acid, and, as such, a less active anti-zymotic; and Thirdly, because it often causes troublesome diarrhea, while the sulphites of soda and magnesia never produce such effects; now, of these last two, I prefer the magnesian salt, and employ it exclusively for internal administration, as, not only, it is less unpalatable, owing to its insolubility, but in consequence of the atomic weight of magnesia, it contains bulk for bulk more acid than the soda salt; and, as the acid is the active ingredient, it stands to reason that the magnesian salt must be the most efficacious of the two; the sulphite of soda I employ, almost exclusively, for external applications, because, in consequence of its greater solubility, a much stronger lotion can be made with it than with the magnesian salt. The sulphites of potass, ammonia, and lime, are also active anti-zymotics, but in no way superior to the salts of magnesia and soda, while their very noxious taste render them undesirable.

It is very much to be regretted that so few physicians have brought the value of these remedies to the test of clinical experiment, by which, after all, every remedy must be tried, and stand or fall by the result; as I several years ago asserted, this remedy is perfectly harmless; is not like arsenic, mercury, iodine, or strychnia, a double-edged instrument, equally able to save or to destroy; neither is it one of those remedies which can only be administered in fractional doses, and of which a grain more may endanger the life of

a patient; I have myself taken six drachms of it in twenty-four hours without any evil result, and I never have had to prescribe more than half an ounce of it in practice, even in extreme cases; I cannot, therefore, conceive why a more extended trial of its properties has not been made. Perhaps it may be thought by some that I exaggerate to myself the result of my treatment, and that I naturally feel biassed in favour of a remedy, that I have so prominently brought into notice during the last few years; be it so; let my experiments on animals be forgotten, and the results of my treatment of diseases in man be ignored, still the important paper of Dr. Cummins on scarlatina, *Dublin Quarterly Journal*, No. 77, p. 11; the observations of Dr. Waters in same Journal, and the paper on Diphtheria by Dr. Hayden in the same Journal, No. 83, p. 86, go far to prove (even if we had no other evidence), that we possess, in the sulphites, a powerful agent, whose action in the animal economy well deserves to be studied.

The following case will be read with interest:—Last Winter I had under my care a gentleman, over eighty, who was suffering from the most aggravated form of pompholyx diutinus I ever witnessed. The bullæ daily appeared all over his body, principally affecting the lower half, and varied in size from a millet seed to a hen's egg; when first they cropped out their contents were clear; but in twenty-four hours became turbid, then opaque, and the raw surface, which appeared when the bullæ burst, remained long unhealed, and discharged an acrid bad-smelling pus.

The patient had been for some months in this state, and was gradually getting worse, when he came up from the country and placed himself under my care; every variety of treatment having been tried, both locally and constitutionally, without obtaining any beneficial result, I determined, in consultation with Dr. Hudson, on placing the patient under a sulphitic treatment, in the hopes of arresting the further increase of the disease, and thus giving nature an opportunity of eliminating the poison. As the patient was so advanced in years I preferred to commence by administering the remedy endermically, as I wanted besides to observe what effect the remedy would have on the secreting surfaces. I therefore dressed the raw spots with pledgets of lint soaked in a saturated solution of sulphite of soda in water, adding a little glycerine to the lotion; the immediate effect on the sores was most remarkable; by the second day they had completely lost their unhealthy dirty look, and had assumed a bright rosy hue, and were quickly skinning

on the edges, and the pain caused by such an extent of raw surface was completely relieved by the application. At this time the extent of the sores was so great that scarcely a sound spot could be found from the hips to the soles of the feet. Being curious to ascertain whether the remedy was acting only locally or was also entering the system generally, I got my friend Dr. Davy to examine some of the urine of this gentleman, when he found that it gave ample evidence of the presence of *sulphurous acid*. After some weeks of treatment by external application, during which a very great improvement could be observed, both in the size of the bullæ and their daily numbers, I commenced the internal administration of the remedy in ten-grain doses every fourth hour, using this time the sulphite of magnesia; no bad result occurred—no diarrhea, no loss of appetite, no nausea, but a still greater improvement; the bullæ now appearing only at intervals of two or three days, never larger than half an inch in diameter, and only one or two at a time; while at the commencement, when he first came under my care, the average number of bullæ which daily made their appearance was from twenty-five to thirty, their size averaging one inch and a half in diameter. The patient was now so far improved as to be able to go out to drive every day, and to enjoy life, whereas during the previous few months his existence had been a burthen to him; unfortunately, one day, he exposed himself to cold, got influenza, of which at the time there was an epidemic in Dublin, and in a few days he died—a result not to be wondered at when it is remembered that influenza at the age of eighty-two is almost always fatal. Two instructive facts are deducible from the above case: first and foremost, that sulphite of magnesia does not disturb digestion nor cause diarrhea, both of which bad effects have been laid to the charge of this remedy; and, secondly, that the sulphites, even when applied endermically, are absorbed and circulated *as sulphites*, and finally excreted by the kidneys undecomposed, *at least, in part*. This is a very important fact to note, because it has been asserted that if even my theory were correct, the treatment by sulphites could not stand the test of experiment, as the sulphites, during their progress through the economy, become oxydized and converted into sulphates, even before they reach the circulation. This I have repeatedly proved to be incorrect; and though some portion of the salt, no doubt, does become further oxydized, a considerable portion will find its way unchanged into the circulation, as I have been able to detect the

presence of sulphurous acid in the urine even when very small doses of the salt had been administered.*

The next example I shall bring forward is a case of multiple abscesses depending on the absorption of a zymotic poison. A sailor, twenty-four years of age, of a not very robust constitution, but still not of a strumous habit, returning from a voyage in the West Indies, during which he had visited places where there was yellow fever, was attacked during the voyage home by sickness of anomalous character; he had shiverings occasionally, and at times some vomiting and diarrhea; the captain of his ship gave him some simple purgatives and other remedies, and he seemed at times to improve, but still the man complained of terrible lassitude, was considerably jaundiced, and after a short time was attacked with boils and abscesses; eventually he reached the port of Dublin, when he came under my care. I found, on examination, that he had whitlows on almost every finger, a very ill-looking semi-phagedenic ulceration of the glands of the groin, and several superficial sores on his legs and arms; his pulse ranged between 85 and 100, his bowels were relaxed, tongue coated, skin yellowish, and hot. Having carefully listened to his history I thought it probable that he had absorbed some animal poison, and that nature was busy eliminating it. I at once administered sulphite of magnesia, in scruple doses, three times a day, and dressed all the abraded surfaces with a saturated solution of sulphite of soda. After a week I increased the dose to one scruple, four times a day, and administered it in decoction of bark and compound tincture of bark; the result was most satisfactory; the sore in the groin became healthy-looking, the whitlows rapidly healed, and in three weeks he ceased to attend. Now in this case I am convinced that the man had been infected, while in the West Indies, with the poison of yellow fever, which from some cause or other having been prevented from pursuing its ordinary course, had contaminated the blood and given rise to those boils, whitlows, and abscesses, which were no more than the results of the efforts which nature was making to expel the poison; but as fast as nature expelled it at one point the poison

* Dr. Davy's mode of analysis is very simple and efficacious, and can be easily applied in a hospital ward. A large test tube being half filled with urine slightly acidulated with pure muriatic acid, a piece of starched paper stained with a weak solution of tincture of iodine, is suspended in the tube over, but not in contact with, the urine; if any sulphite is in the urine the iodine stain will be removed by the sulphurous acid gas which is evolved.

was re-producing itself in another, and eventually, in all probability, the patient would have sunk from exhaustion, but the presence of the sulphite which I administered checked the further increase of the poison, and then nature was enabled to effect a cure.

A short time ago I was attending a gentleman who was dying from phthisis senilis; his expectoration was distressingly profuse and was annoying him more than any other symptom; remembering the success which had attended the administration of a sulphite in a case of phthisis which I attended in 1862, I administered five grains of bisulphite of magnesia every third hour; the result was most remarkable; not only was the purulent expectoration reduced far beyond what I had expected, but the night sweats, which also troubled him excessively, almost entirely ceased; and though the medicine was unable to avert the final result, it was at any rate able to give ease and comfort to a dying man, which, next to saving life, is the great object of our mission in this world.

A few days ago a well-known French cook, in this city, came to me in great alarm about himself; he had given himself a very slight wound, a mere scratch with his knife, while dressing a piece of raw meat. I never saw a man looking more ill; he was jaundiced; he was so feeble as scarcely to be able to stand; his pulse was 100, his tongue foul, his bowels relaxed, and his wounded hand very much swelled, and excruciatingly painful. The wound though slight was dark and angry-looking, and red lines coursed up his fore-arm, following the tracks of the lymphatics. I wrapped up his hand and arm in lint soaked in a saturated tepid solution of sulphite of soda (which is much more soluble than sulphite of magnesia), and wrapped this again in gutta percha tissue, and administered sulphite of magnesia in ten-grain doses, four times a day. The improvement was rapid and manifest; the dressing had not been three hours on his hand and arm when he experienced the greatest relief from pain. In two days the swelling had almost entirely subsided, and in less than a week from the commencement of the treatment he was perfectly well. I have just stated that the application of sulphite of soda immediately relieved the pain, which at the time of my first visit was almost intolerable. I have had occasion in several cases to observe the extraordinary anesthetic property of sulphite of soda when applied to raw surfaces, especially in burns; and although I cannot well explain to myself the way in which this phenomenon occurs, still I have too often observed its recurrence to any way doubt the accuracy of my observation. I

had a case of very ill-conditioned sore throat under my care last Spring, which I feared might terminate in diphtheria. I administered sulphite of magnesia internally, and three times a day; I directed that half a scruple of the powdered salt should be insufflated by means of a quill into the pharynx, which last invariably produced the greatest ease from pain.

I have the notes of several other cases equally instructive and interesting, but I do not wish to weary my readers with useless repetitions; each case points in the same direction; and although each case was not a success, yet the disappointments have been few; and although up to this date both my theory and its application have found but few followers in this country, still I venture to predict that eventually the treatment of zymotic diseases by the administration of sulphites will be as fully recognized as that of ague by cinchona; nay more, for if paludal and intermittent fevers be the result of zymotic infection, as it is almost certain that they are, cinchona itself will be superseded by the sulphites both in the treatment and prophylaxis of those diseases.

ART. XI.—*Report on Scalds of the Larynx.* By PHILIP BEVAN, M.D., T.C.D.; F.R.C.S.I.; Surgeon to Mercer's Hospital.

IN the fifty-seventh number of this Journal, I published four cases of scalds of the larynx cured by the rapid exhibition of mercury; I now desire to record five other cases, in which the same treatment has been adopted with complete success. Two of these have been already published, by Dr. Croly, in the *Medical Press* of the 2nd May, 1866; one case occurred to Dr. Geoghegan, in the City of Dublin Hospital; one in Mercer's Hospital, to Dr. Ledwich; and another to myself in the same institution; so that, in nine consecutive cases the practice has been successful.

When we contrast this result with the excessive mortality which usually follows the treatment of the accident by tracheotomy it must be considered a most important improvement in practice. As to the fatality of the latter treatment it is difficult to arrive at anything like correct statistics, as the successful cases are usually published, whilst the unsuccessful ones are forgotten; but I think it will be easy to prove that it is one of the most fatal operations in surgery, when performed for this accident. I freely confess it