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THE
USE AND VALUE OF ARSENIC
IN THE TREATMENT OF
DISEASES OF THE SKIN.

BY

L. DUNCAN BULKLEY, A. M., M. D.,

PHYSICIAN TO THE SKIN DEPARTMENT, DEMILT DISPENSARY, NEW YORK; PERMANENT
MEMBER OF THE AMERICAN MEDICAL ASSOCIATION; FELLOW OF THE NEW
YORK ACADEMY OF MEDICINE; MEMBER OF THE NEW YORK COUNTY
MEDICAL AND DERMATOLOGICAL SOCIETIES, ETC.

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PREFACE.

THE following essay does not claim to be exhaustive ; its aim is to present the subject of the therapeutical use and value of arsenic in diseases of the skin in a clear and practical manner, and to furnish the practitioner with evidence of its safety on the one hand and its utility on the other. It is hoped that, by pointing out where it is of service and in what diseases useless, the remedy may be prescribed in a more intelligent manner than is frequently the case, and that in the end, perhaps, less arsenic may be used, because its employment may be restricted to proper cases.

I think it right to state, in reference to the larger doses given in certain cases here reported, that the experience may be exceptional, and desire to warn any, especially laymen, against construing anything herein said into a warrant for an injudicious use of the mineral, for a remedy which is so potent for good is capable also of inflicting much evil. Under no consideration should arsenic be taken except under the immediate guidance of a medical man of experience.

This essay was read before the American Medical Association, June 7, 1876, and ordered to be printed in the Transactions : it appeared in the NEW YORK MEDICAL JOURNAL, for August, 1876, and is thence reprinted. It is presented in this form for convenience of reference, it being believed that many would desire it separate from the Transactions of

the Association. Should it be thought by some that I contradict anything in my essay before the same Association two years ago, on "The Management of Eczema," I will beg a careful study of this entire essay and also of that one; and, as a further caution against the misconstruction of what is contained in this, I will quote, as still true, in my opinion, the eighth and last proposition given in the summing up of the former essay: "Arsenic and zinc ointment, while serviceable in many instances, are so far from being specifics for eczema, that their use is injurious in many cases, while almost always other remedies will either suffice alone or greatly assist their action." The only qualification which two years' additional experience would lead me to make, is to say, "frequently" instead of "almost always," in the above sentence.

L. D. B.

NEW YORK, *September*, 1876.

ON THE USE AND VALUE OF ARSENIC IN THE TREATMENT OF DISEASES OF THE SKIN.

THERE is probably no empirical remedy in medicine better known or more frequently prescribed than is arsenic in the treatment of diseases of the skin, and yet I venture to say that there is no remedy whose action is so little understood, and withal whose effect is more uncertain, than is that of the same drug, as generally used ; for, when we consider diseases of the skin as a class, without any special reference to the individual case or the diagnosis, arsenic is not only useless in a very large share of the cases, but is very frequently absolutely harmful.

The subject has presented itself thus to my mind, because in my practice it has been very uncommon for me to meet with a patient, even with eruptions which have proved to be parasitic or syphilitic, who has been previously treated by general practitioners, who has not taken arsenic, and it is very commonly the failure of this supposed specific which has led the physician to seek the consultation.

Before speaking of the true value of arsenic in the treatment of any disease of the skin, I must, therefore, insist upon

the absolute necessity of accuracy in diagnosis as the very first step toward success in treatment; for affections of this great organ, the skin, are not a unit, as the practice of so many would seem to indicate, but they are more diversified than those of any other portions of the body, and require treatment as different as the pathological states and etiological factors are various. To prescribe arsenic, therefore, because the skin is affected, is as unwarranted as it is to seize upon any other empirical remedy, and to administer it in each and every disease to which any other special organ is subject.

I must be pardoned for dwelling thus upon what is a truism to many, for all will acknowledge that to a great majority of practitioners the exhibition of an eruption immediately suggests to the mind the idea of arsenic. It will be understood, therefore, that in my general remarks on the efficacy of arsenic in diseases of the skin, I refer not to the whole as a class, but to the special affections in which experience has shown it to be of service.

Popular opinion is never without some measure of support in truth, and the general medical impression of the value of arsenic, as an agent to modify changes in the skin, has foundations which it is not difficult to discern. It will be our task to examine these, to see how they have stood the test of time and experience, and to endeavor therefrom to furnish as definite and accurate indications as possible for our future guidance in the use of this drug.

Although now so generally known in connection with the treatment of diseases of the skin, the use of arsenic in this class of affections is not a gift of the ancients, indeed it dates back less than one hundred years, and those to whom its general introduction was principally due have passed away only within the memory of many now living, as Hunt, Emery, Biett, and others. An essay on the action of arsenic would not be complete without the mention of the name of Girdlestone, who was almost the first to suggest its use in diseases of the skin;¹ nor should the impetus given by Begbie's paper on the physiological effects of arsenic² be overlooked.

¹ *London Medical and Physical Journal*, March, 1806.

² *Edinburgh Medical Journal*, vol. iii., 1859, p. 961.

The very general use into which arsenic has come is attributable, I think, to three causes: first, to the very general desire which naturally exists in the minds of all to find some remedy which is a specific for a certain disease or class of diseases, the history of medicine being made up of successive attempts at finding specific remedies; second, to the physiological effects of the drug as observed in the coats of animals to whom it has been given, which, as is known, become sleek and glossy, and also in the clear skin of the arsenic-eaters of Styria, where the practice of consuming this drug as a condiment and stimulant has been verified by recent observation;¹ the third cause is, the very favorable reports which have been made from time to time as to the effects of arsenic in *certain* diseases of the skin, and inferentially it has come to be prescribed in almost all affections of this organ, partly from carelessness in diagnosis and partly in the vain hope that in some way or other, mysteriously unknown, it would modify the eruption.

That arsenic has a very decided effect upon the epithelial elements of the body there can be no question, both from physiological and therapeutical evidences; the silvery tongue after its long continuance, which results from the abundant growth of the epithelium obscuring the normal coloration, and its effects on the hairs of animals are instances of this, as also its therapeutic effects in scaly diseases of the skin. But it is also claimed and demonstrated pretty conclusively that arsenic influences greatly the circulatory system, as is shown by the increased feeling of warmth in patients taking it, and it is said to give increased strength and augmented frequency to the pulse; it is also well known that the first indication of the full physiological action of the drug is the congestion of the conjunctiva, and fullness about the face and eyes.

There is every reason, however, to believe that arsenic acts primarily through the nervous system, and that the changes induced in the skin and vascular system are secondary to this—an opinion which is shared by many, and which finds support in its very serviceable action in certain nervous diseases,

¹ Waring's "Practical Therapeutics," third American edition, Philadelphia, 1874, p. 107.

chorea, neuralgia, asthma, etc., and also in its effect in malarial disease. Those who have studied its action in diseases of the skin also agree that its results are obtained by virtue of its neuro-tonic principles. Dr. Albutt¹ says, "Arsenic in my hands has been certainly and regularly efficacious in those skin-diseases which on other grounds I referred, or was disposed to refer, to the class of cutaneous neuroses, while in other skin-affections it has been inert or injurious." Although I cannot subscribe wholly to this, I believe most firmly that the results from arsenic are obtained by virtue of its action on the nervous system, and I have elsewhere shown the very great dependence of many, if not all, skin-diseases upon structural or functional derangement of the nervous portion of our organism;² but I also believe in the value of arsenic as a general modifier of cutaneous nutrition, and, as will appear later, I regard it of the utmost service in many of the diseases of the integument, even where no nervous elements can be found.

It will be understood, of course, that arsenic acts through the medium of the blood; it is absorbed, enters the circulation, can be detected in the urine, and also is found in the viscera after death by poisoning from it.

With this much of introduction, let us proceed to consider what real value experience has shown arsenic to have in diseases of the skin. About this we will find not a little conflict of opinion: some, as the late Mr. Thomas Hunt, of London, a man of large experience with diseases of the skin, believe it to be all efficient, to be indeed almost the sole remedy in a large share of these affections, while others ignore it almost entirely or yield it only a very small place in the remedies they recommend to meet this class of diseases. The truth evidently lies between the two extremes, and, as it is seldom safe to accept any dictum in medicine, let us study the remedy before us cautiously and with a judgment based on what is known of its physiological action, and of the nature of the affections to be treated.

¹ *The Practitioner*, November, 1874, p. 322.

² "The Relations of the Nervous System to Diseases of the Skin." G. P. Putnam's Sons, 1875. Also *Chicago Journal of Nervous and Mental Diseases*, October, 1875.

A single point more needs first to be considered, and that is, the element of time. Arsenic in medicinal doses is slow in its action, and is therefore suited for chronic diseases, and results are not to be expected from it at once; but, if any good is to be done, it is by a continuance of its effect for a not inconsiderable period of time. It is, therefore, of little service in the really acute diseases of the skin; and, as a corollary to this, I may state that it is directly contraindicated in inflammatory states, and must not be administered when these supervene in chronic cases. But, while acknowledging that the results expected from arsenic are tardy, I regard it a mistake to think they must be waited for to the exclusion of other remedies, nor do I believe that success will always be obtained by waiting for arsenic, as the writings of Mr. Hunt would almost lead the practitioner little acquainted with the management of cutaneous disease to think. Nor is it right to imagine that the disease is incurable because arsenic fails, as the practice of so many seems to indicate, whatever their theory may be.

We will consider first the disease *psoriasis*, the one for which arsenic is most commonly prescribed and for which it was originally first given, if I mistake not, and inquire how far experience warrants us in trusting to it, and what it can and what it cannot accomplish; we will afterward mention the other diseases in which it is applicable as well, and also those in which little or no beneficial effect can be obtained from the drug.

The older accounts of the success in the treatment of psoriasis with arsenic appear very much exaggerated, and lead one who is familiar with the disease to doubt the truth or the judgment of the reporters. I need hardly remind this audience that by psoriasis I understand the disease commonly known by that name here and in Germany and France, where masses of laminated or micaceous scales, always dry, are seated upon a reddened base, slightly elevated, for the most part circular, and the eruption occupies, as a rule, the extensor surfaces of the body. This is the eruption sometimes called lepra by old writers and alphas by Mr. Wilson, who applies the term psoriasis to the scaly stage of eczema. Lepra

or psoriasis, then, is the disease of the skin in the treatment of which I find the first mention of the administration of arsenic, and it is in psoriasis that arsenic has been prescribed most largely and confidently ever since, for at least fifty years and more, and this is almost the only disease of the skin in which Hebra allows that arsenic has any effect.

But psoriasis is the disease above all others in which it is most difficult to determine the true action of any remedy; because of its natural tendency to change with the season, for all know that the eruption of psoriasis may disappear quite spontaneously, and it is rare that it does not become very much less pronounced in summer; moreover, in certain cases a marked change in diet or habitation, or some very simple remedy, or the accession of acute internal disease, may produce a very visible and decided alteration in the appearance of the patches. The reports, therefore, of great success attending the internal use of arsenic in this disease must be accepted with considerable caution, especially when we take into consideration the fact that the eruption may return after an absence or an apparent cure of one, two, or more years.

But can arsenic ever cure psoriasis? I answer most emphatically that it can, and that in proportion, first, to the age of the patient; second, to the duration of the disease; and, third, to the amount of previous treatment. 1. In very young subjects, I mean ten or twelve years or under, psoriasis is comparatively curable, and, as a rule, need not run on, as I have known of its doing, from the age of five to that of fifty-five years, and arsenic should always be given fearlessly and patiently to children afflicted with psoriasis, and with very good probability of effecting a cure, that is, a *permanent* removal of the disease. 2. Recent attacks of psoriasis for the first time in persons of older years may be treated with arsenic with very encouraging prospect of success, but the remedy should be continued for a long time and very steadily. 3. In those who have had the eruption for many years and have received little or no treatment, I believe arsenic will accomplish the cure of the disease in many instances, although a previous trial of the remedy irregularly, and conse-

quently ineffectually, diminishes very considerably the chances of success.

In those cases, however, where arsenic has been tried repeatedly and perhaps for some length of time, that is, weeks or months, and without permanent result, little can be expected from it, even from a full and faithful course, such as will be detailed later. But even here it will be found that, combined or alternated with other remedies, arsenic is still of power; it will be constantly found that the error was not in the drug but in the manner in which it was used; when other elements of disease or derangement are removed, the remedy will be able to assert itself. In the event of its final failure recourse must be had to other remedies, as phosphorus, tar, etc., of which this is not the place to speak, but which give success when arsenic fails.

A word in regard to the length of time for which arsenic must be given in psoriasis. Begbie,¹ in his admirable essay on the physiological and therapeutical effects of arsenic, says: "I have never seen the loathsome scales of lepra or psoriasis drop from the skin and leave healthy cuticle till the eye and tongue manifested that the system was under the influence of the mineral, and that for days or weeks together." And this persistence in the remedy, which is advised by many, I can indorse most heartily, and I charge much of the want of success in the treatment of this disease to the physician, who, not having himself assurance in the diagnosis and without understanding and belief in the proper treatment, fails and must fail to inspire the patient with the confidence necessary for a prolonged arsenical course. To quote again from Begbie:² "The curative properties of arsenic may be obtained in some instances before the physiological effects present themselves, but, in order to secure its virtues as an alterative in a large class of chronic diseases which yield to its influence, it will be necessary to push the medicine to the full development of the phenomena which first indicate its peculiar action on the system. Arsenic as a remedy is too often suspended or altogether abandoned at the very moment when its curative powers are

¹ *Edinburgh Medical Journal*, vol. iii., p. 965, 1858.

² *Loc. cit.*, p. 961.

coming into play. The earlier manifestation of its physiological action is looked upon as its poisonous operation; the patient declares that the medicine has disagreed with him; forthwith the attendant shares his fears, the prescription is changed, and another case is added to the many in which arsenic is said to have failed after a fair trial of its efficacy."

To obtain the full measure of success with arsenic in psoriasis, it should not only be administered until the eruption entirely disappears, but it should be continued for a period thereafter, varying in proportion to the length of time the disease has previously existed—and this time measured by months, rather than by days or weeks. There will be difficulty in securing this, but of its value and necessity there can be no doubt.

In speaking of the power of arsenic over psoriasis, I would not leave the impression that it is to be used to the exclusion of other remedies, for in my experience I think I have never seen a case cured by arsenic alone, but I am only endeavoring to give due credit to a remedy which some of the modern practitioners in dermatology have much undervalued. This has happened, I opine, chiefly from the impatience which the more rapid and visible (and temporary) results of local treatment, as witnessed in some of the hospitals abroad, beget, which results it is difficult to obtain in the ordinary run of practice here, and a knowledge of which, moreover, the general practitioner, for whom I write this, cannot acquire.

Coming now to the varied and oftentimes perplexing *eczema*, what can we expect from arsenic in its treatment? Two years ago, when addressing this learned Association on "The Management of Eczema,"¹ I endeavored to warn against the far too common rut into which practitioners fall in regard to this disease, that of generally prescribing oxide of zinc ointment and Fowler's solution, and there ending their thought of the case; also on other occasions I have striven, in the same general direction, to show the important relations of the ner-

¹ "Transactions of American Medical Association," 1874. Reprinted by G. P. Putnam's Sons, New York.

vous system,¹ as also the relations of the state of the urine,² to this and other diseases of the skin. I sincerely trust, therefore, that I will not be misunderstood when I speak favorably of the treatment of eczema with arsenic, for, while I prize it most highly in certain cases of this disease, I would by no means prescribe it in every case nor for every condition of the disease, and rarely do I trust to it alone. I do not, therefore, when I laud its action in some cases, wish to leave the impression that arsenic is the sole remedy for eczema, although it must be acknowledged that there is no other one remedy with like effect, hardly excepting cod-liver oil, whose action is marvelous in proper subjects.

Arsenic, then, is capable of affecting certain cases of eczema in a most desirable manner, and occasionally is, I believe, essential to a cure, as the following history will show :

T. H., aged five years, came first under my care on May 11, 1875. He had suffered continuously from a severe eczema of the head, face, and other parts for more than four years and a half, in varying severity at times. When first seen, the whole face, eyes, head and neck were covered with a moist papular eczema, bearing evidence of great itching, and his father testified that he tore the parts constantly, his sleep at night being almost entirely prevented. The arms were likewise affected and the little patient wore the troubled, exhausted look common to such sufferers, and the father seemed almost equally discouraged.

He was treated in the usual way for sixteen weeks, taking cod-liver oil for a period, and for the latter six weeks a mixture of iron and bark with three minims of Fowler's solution three times a day. At the end of this time there had been really no gain, and the boy's sufferings were intense, although the treatment had been followed very faithfully. At this date, other internal medication being suspended, a mixture of equal parts of Fowler's solution and cinnamon water was

¹ *Archives of Electrology and Neurology*, November, 1874, and May, 1875. Reprinted by G. P. Putnam's Sons, New York.

² *Archives of Dermatology*, October, 1875. Reprinted by G. P. Putnam's Sons, New York.

prescribed, and four drops of this were ordered to be taken three times a day, the dose being increased by two drops every other day until twenty were reached. The same local treatment as before was used, with the addition of a wash of bicarbonate of soda, about half an ounce to the pint.

Sixteen days later it was recorded that there was great relief—he was then taking ten drops of Fowler's solution, or twenty of the mixture, three times daily—a large portion of the eruption had become papular, there were almost no excoriations, the child slept well and looked markedly better in every way. The dose was then increased, augmenting, as before, by two drops of the mixture or one of the arsenic until fifteen drops of Fowler's solution were taken three times a day. This dose being reached it was continued three weeks longer, until December 4th, when it was noted that the eruption had nearly disappeared, the father stating that the child had never before been so free from the eruption since its inception, four years and a half ago. The dose of fifteen drops of Fowler, thrice daily, was continued four weeks longer, it having caused no inconvenience, and the child continuing well, the father testifying that whenever the arsenic was omitted the itching returned. The dose of arsenic was then increased slowly until twenty drops of Fowler's solution were taken three times daily, but when this full quantity was reached some nausea and vomiting occurred and the dose was lowered at once to five drops, with instructions to increase slowly to fifteen drops, thrice a day, an amount previously tolerated perfectly. He continued at this dose, and on March 11th, the time of the last record, he remained entirely well, with no trace of his eczema. There was no change made in the local treatment, and no other remedy used but the arsenic as above described; during the latter part of the time the local treatment was rather neglected.

This interesting and unusual case shows the control over eczema which arsenic may have when exactly suited to it, and I can affirm that the results surprised me; for, though I have always prescribed considerable arsenic, I have not been accustomed to see such results from it, and I speak from the experience of many hundreds, if not thousands of cases in which

I have ordered this drug. After a continuance of the disease, in this case, for more than four and a half years, and a treatment by me faithfully for nearly four months, with almost no results, the disease yielded completely to arsenic alone when the doses were made sufficiently large and its use persisted in. We see here, also, a great and perhaps unusual tolerance of the mineral, a child of five years taking fifteen drops of Fowler's solution, or one-eighth of a grain of arsenious acid three times a day, and for a long time, which is quite at variance with what has been taught as to the advisability and safety of administering arsenic to children. My experience has been, as will be mentioned later, that children bear arsenic extremely well even at a very tender age, and that, as a rule, it accomplishes far more for them than for those in later years. Dr. McCall Anderson¹ reports cases of children where comparatively large doses of Fowler's solution were taken.

In regard to the rules for the applicability of arsenic to the treatment of cases of eczema, it is indicated: first, as most writers agree, in nervous cases; that is, in those where there is a history of neuroses, either in themselves or in their families. This class of sufferers not uncommonly have some form of neuralgia, as gastralgia, etc., and the eruption has a decidedly nervous type, that is, it itches fearfully; sometimes it burns and smarts. But itching in eczema does not always indicate the necessity for arsenic, and this I consider one of the most important points to bear in mind in the management of this disease, namely, that itching is by no means always a primarily nervous affair, but may be due to the circulation of effete products in the blood, which excite the nerve irritation, as is instanced in the itching of jaundice, and in certain forms of disease of the kidneys. It is useless, then, to administer arsenic in such a case; indeed, it does positive harm, because by its action upon the liver it directly increases the difficulty; and one of the recognized rules in giving arsenic, which is very generally forgotten by practitioners, is that its administration is to be suspended when urinary de-

¹ "Analysis of 11,000 Cases of Skin Diseases," London, 1872, p. 147.

rangements occur ; or, at least, that they are to be removed before benefit can be expected from the arsenic.

The second class of cases of eczema benefited by arsenic is that where there exists an arthritic history, past or present, in patient or family : gout, rheumatism, asthma, bronchitis, etc. Begbie was so impressed with this, that he says,¹ " Arsenic is especially an alterative in the rheumatic diathesis ; it is, if I may be allowed the expression, an anti-rheumatic." In these patients the skin is red and delicate, the epidermal layer being very thin. The use of arsenic in the skin diseases in this class of patients was probably suggested by its good effects observed in their skin lesions when given for rheumatic symptoms, for the medicine was had in repute for these latter before it came to be used for cutaneous diseases. But in these subjects there is a very frequent need of alkaline purgatives, as the sulphate of magnesia, and their urine should be watched. Among the earlier signs of the physiological action of arsenic, given by some, is a marked increase in the quantity of the urine and a free deposit of urates. While I have frequently observed this to occur in patients taking arsenic, I have never been able to recognize it as an effect of the drug.

A third class of patients with eczema, where arsenic may be ordered with beneficial effect, are those where there is more or less of malarial element. Dr. L. P. Yandell, Jr., of Louisville, has recently expressed the opinion² that malaria is a most prolific source of acute disease of the skin ; and, although by no means agreeing with him in the full, I am inclined to think that it is an element too often forgotten. We know of urticaria assuming a markedly periodic form, and may not the augmented itching of eczema at certain periods indicate something of a malarial origin. Certain it is that arsenic is often peculiarly beneficial to eczema patients who have been under malarious influence, or the subjects of some of the more commonly recognized forms of disease traceable to this poisoning.

¹ *Edinburgh Medical Journal*, vol. iii., 1858, p. 981.

² *American Practitioner*, May, 1876.

Arsonic is not beneficial, as far as my experience goes, in patients who are markedly strumous ; at any rate not until this feature has been previously met with cod-liver oil, iron, etc. ; but sometimes after these have done their work the disease remains, and arsonic is necessary to its removal. A striking instance of its very great power under these circumstances has been recently under my observation.

Mamie C., as strumous a child of three years as you often see, has attended quite faithfully at Demilt for fifteen months. She has light hair and eyes, and pale, delicate skin ; the eyes have always appeared weak, she having strumous ophthalmia and a purulent discharge from the ears. From her admission to the dispensary, March 5, 1875, to October 30th, she was under varied treatment for an impetiginous eczema, involving the entire head and most of the face, but with hardly any success. She took an arsonical mixture for a time, and for the latter few months took cod-liver oil, to the manifest improvement of her health, but without affecting the eczema much ; nor did it improve at all under the smaller doses of arsonic first given. She was then, October 30th, ordered Fowler's solution and cinnamon water, equal parts of each, taking at first four drops three times a day, increasing gradually to twenty, or ten drops of Fowler. This latter amount she bore well, and improved under it rapidly, with no change in the local treatment which had been previously employed ; and within three months the eczema of nearly three years' duration was well.

I have administered arsonic in comparatively large quantities to children of very tender years, or rather months, who have had eczema, and must confess that I have sometimes been surprised at the results, so different were they from what the books indicate. I was led to use it alone in these cases, and in the large doses I mention, by a suggestion of my friend, Dr. Stephen Rogers, of New York, a man of large experience and uncommon acuteness, who detailed to me, a while ago, some very striking cases of its use, which I have since equaled repeatedly in my own experience, as the following testify :

J. D., an apparently healthy boy of eighteen months, had

a characteristic moist eczema of the right ear and side of the face, he having had the disease seven months. He was ordered equal parts of Fowler's solution and cinnamon water, and six drops of this was taken thrice daily with the food. If not disagreeing, the dose was to be increased to eight drops, or four of Fowler. Five days later the eruption was much better, having dried up by one-half; there had been *no local treatment whatever*. The medicine had not affected the stomach or bowels, which latter were still somewhat constipated. The dose was increased to ten drops, or five of arsenic, three times a day, and a good recovery was made. Ellen Laury, aged twenty-one months, had had eczema of the head for nine months; she was given the same with like results. Within five days it was recorded that there was not so much itching, and that the eruption was much better. Many such accounts could be given did space permit, though it is impossible to keep accurate records of the larger share of dispensary practice. I have administered arsenic to very many infants of all ages, from three and a half months upward, and have never yet seen any cause to regret it, or any evil consequences result. I speak this advisedly and after much thought; and, although I would not by any means encourage the indiscriminate deluging of every infant who has eczema with large doses of this poisonous mineral, still, in proper cases, as indicated by the preceding three states described as requiring arsenic, and observing the rules and precautions for its administration to be hereafter set forth, I believe that arsenic is not only harmless but highly beneficial, and I should be extremely sorry to be deprived of this means of treating infantile eczema.

Be it remembered, that in all this I do not draw back one whit from the position taken before this Association, two years ago, in my essay on the management of eczema. I am only speaking of proper cases, carefully studied, with a due regard to local and general causes of irritation, and with a diligent supervision of the diet and hygiene, and with such local and general measures as I then indicated, which I cannot here touch upon. It is true that the cases I have detailed were treated by arsenic alone—this I am not yet prepared to, ad-

vise ; they are recorded here only to demonstrate the power of the drug over the disease. I may mention that my friend, Dr. Daniel Lewis, of this city, has also treated infants on the plan detailed, at the suggestion of Dr. Rogers, and successfully ; also, that my assistant, Dr. Robert Campbell, has witnessed the progress of many such cases ; likewise a number of physicians who have attended my private classes at Demilt Dispensary. Wilson has no hesitation in prescribing arsenic for infants a few weeks old.¹

But it will not infrequently happen while patients, especially these little ones, are taking arsenic, and the eczema doing well, that a bronchitis will supervene ; and I agree with McCall Anderson,² that patients are more liable to catch cold while under arsenic. The medicine may then be suspended for a day or two, a good dose of calomel is given, one or two grains, repeated the next day, for an infant, and the cough will disappear, and the arsenic may be returned to. The same should be given if there is constipation ; if diarrhœa occurs, diminish the dose or add opium.

Sometimes these interruptions appear more serious, and attention must be paid to them, and, of course, other diseases may occur, and complicate affairs greatly. The attendants are ever ready to attribute these and all troubles to a "driving in of the eruption," etc. ; and, if it is known that arsenic is being given, constant fear of dangers from it will arise. Great annoyance may sometimes thus ensue, as in the following case, which was recently committed to my care by a prominent physician in a neighboring city, the family removing to New York temporarily for the sole purpose of having the child treated.

X., a fine-looking male child, eighteen months old, had suffered continuously from eczema of the head, face, and most of the body since six weeks of age. He had been under greatly varied treatment, and had tried most of the measures suited to such cases, having been under the care of seven physicians previously. When first seen, the child was in a

¹ "Lectures on Eczema," etc. London, 1870, p. 214.

² "A Practical Treatise on Eczema." Third edition, London, 1874, p. 99.

very distressing state, scratching continually and crying vociferously if prevented. The head and face were covered with moist and papular eczema, some portions scabbed and crusted; the legs were covered about the knees with the marks of scratching, thick yellow crusts, and various parts of the body exhibited subacute eczema in various states.

He was ordered about a grain of calomel two or three times a week (the bowels had always been constipated, and the urine high colored and passed frequently), and he was given an ointment containing a little tar and oxide of zinc. I prescribed also equal parts of De Valangin's solution of chloride of arsenic (which will be described later) and cinnamon water, of which he took four drops three times a day, with the meals, increasing it by one drop a day till eight were reached, or four of the arsenical solution. In three days there was great improvement, the relief to the child (and parents) being immense; he scratched hardly at all, and very much of the eruption had already disappeared. But the child had quite a fever and some vomiting, he having eaten something which disordered the stomach; the arsenic was therefore stopped, and a mixture of the acetates of potassa and ammonia and nitre was given. In three days the febrile movement had ceased, and the arsenic mixture was returned to at four drops thrice daily, to be increased slowly to eight. Nine days later it was recorded that there had been still very great improvement, the eight drops (four of arsenic) having been continued three times daily; they were then ordered to be increased to ten. The whole of the eruption was then dry, with slight scaling, and the little fellow made little or no attempt at scratching; this was fifteen days after beginning treatment, he having never been so well previously since the commencement of the disease.

He was then given some wine of iron, and subsequently some quinine, in very small doses, as a tonic, the appetite failing; but both seemed to disagree at once, and produce nausea and great prostration. The arsenic was stopped on the occurrence of these symptoms, but the mother begged a continuance of it, as she realized that it was controlling the disease. Nine days later, or twenty-four days after the first visit, the patient

appeared much better; he was then taking again eight drops of the arsenical mixture three times a day. The eruption had virtually disappeared, only redness and some scaling remaining.

At this time he began to cut some large back teeth, and developed a very marked intermittent fever, the street on which the parents had taken up their residence being unhealthy, on low, made ground, with a wooden pavement, and there was also a noticeably foul-smelling water-closet across the hall. Dr. J. P. P. White saw the case in consultation, and assisted me to the explanation of the symptoms, and lanced the gums; in view of the ill effects of quinine, as already shown, and as the mother asserted that this remedy had always acted badly, we were forced to return to arsenic as an antimalarial remedy, which the mother had begged for a few days previously.

To conclude this history: the mother became alarmed, and a *homœopathic* practitioner was called in. His first exclamation, on learning that the child had been treated by me, as I was told by a friend, was: "What a fearful amount of arsenic the child has had"—the child had had none for eight days (it had not been returned to, as directed), since which all these symptoms had developed, starting, as all recognized, the mother included, from the stomach disturbance, always caused in her family, as I then learned, by iron and quinia. I should not mention this case and its termination, were it not in order to show on what groundless reasons the administration of arsenic is sometimes objected to. I have never seen a case where the independence of the unfavorable symptoms of any action of arsenic was so clearly exhibited as here (who ever heard of arsenic causing periodic intermittent fever!), and yet this case may enter the annals of *homœopathic literature*, for aught I know, as a fearful example of the terrible effects of arsenic, on the authority of the eminent practitioner who rescued the patient. But I am thankful to say that this is the only patient where such an untoward termination has been reached (or even threatened) among hundreds of little ones who have received arsenic at my hands to their own and their parents' delight and comfort. I will not further illustrate this portion now, but shall hope on another occasion to

be able to collect and present my statistics of the use of arsenic, now scattered over many public and private case-books.

Begbie states¹ that he has seen arsenic act through the mother upon a nursing child, four months old, with a diffuse eczema; the mother was kept under its influence to the extent of affecting the eyes and producing the arsenical tongue. McCall Anderson² also says that infants at the breast may be treated by means of arsenic administered to the mother; I have attempted this, but could never assure myself that the desired result was obtained by this or by other measures, as the regimen, etc., which were also directed. Ringer³ states that arsenic may be detected in the milk; if so, the child can certainly be treated by means of it.

Mr. Jonathan Hutchinson, of London, asserts⁴ very positively, that in arsenic we possess a very sure cure of *pemphigus*. I have used this treatment in three cases, with the best results. In the last case, a most severe one of pemphigus gangrenosus, the arsenic was given alone, and its power over the disease was very marked, arresting its progress within twenty-four hours, apparently saving the life of the patient. Although this statement of Hutchinson's is a reproduction of a previous one of his own, made twenty years previously, I find very few cases reported cured by arsenic,⁵ and very little mention of this treatment in the text-books. I now prescribe arsenic in this disease with great confidence. Hutchinson says that it does not merely repress the eruption, but remedies the unknown constitutional cause on which that eruption depends, always very much benefiting the health of the patient. It does not, however, prevent the liability to subsequent attacks; but he states that such attacks are always much less severe than the original one, and

¹ *Edinburgh Medical Journal*, vol. iii., 1858, p. 964.

² "A Practical Treatise on Eczema." 3d edition. London, 1874, p. 100.

³ "A Hand-Book of Therapeutics," 3d edition. New York, 1872, p. 243.

⁴ *Medical Times and Gazette*, October 23, 1875 (*Practitioner*, December, 1875, p. 444).

⁵ *Lancet*, February, 1859, p. 158, and *Medical Times and Gazette*, January, 1864, p. 10. (Stillé's "Therapeutics and Materia Medica." Philadelphia, 1864, vol. ii., p. 714.)

tend, if treated by the same remedy, to diminish in intensity on each successive occasion. He has recently reported a case of very severe pemphigus, in which arsenic appeared to prevent the patient's death.¹ It is not a little remarkable that Hunt does not appear to have tried arsenic in this disease; almost the only affection of the skin in which he has not reported its effects.

Of the value of arsenic in certain forms of *acne*, or, rather, in certain cases, I can speak with considerable positiveness. It certainly does, in proper cases and under proper conditions, exert a most marked influence upon the complexion of the face; an instance or two in proof of this: A gentleman, aged twenty-six, who for ten years had a most distressing eruption of indurated acne, which has left many scars, and who had been treated in many ways, has acquired a beautiful complexion, in about three months, under the use of De Valangin's solution of arsenic, in doses increased from five drops to sixteen, three times daily. Other treatment, lithia, Kissingen water, Baréges baths, etc., has been carried on previously, conjointly and alternately, but the same measures had never the same effect until the use of the arsenic. A young lady of seventeen, with acne simplex, who is still under observation, has obtained a smoothness and delicacy of skin from De Valangin's solution which she never had before. A lady of thirty-five, who has had acne rosacea for many years, finds that, after other treatment, the same arsenical solution in ten-drop doses has given her a complexion far better than she has had since the first appearance of the trouble. In a very marked case of hypertrophic acne rosacea of the end of the nose, in a man of forty years, there has been a diminution of the size of the swelling which is very evident, amounting to nearly one-third of the original size, under the internal use of arsenic, with local bathing in very hot water and a bismuth ointment, a drachm to the ounce.

I could readily give many other cases, but these are sufficient for illustration. Again, however, I must utter the caution against the indiscriminate use of this very powerful drug, and state, that it is only in certain cases, and after, or with

¹ *Medical Times and Gazette*, December 4, 1875.

other remedies, that arsenic can be of service ; out of hundreds of cases of acne, I have given arsenic to but very few. As in eczema and psoriasis, so in acne, the patient is to be treated scientifically, and not the disease empirically ; but, when it is decided to employ this remedy, rules must be observed, and its use persisted in, for its effects are manifested slowly.

I cannot state so positively from personal experience the value of arsenic in other diseases of the skin, but, from the improvement in the nutrition of the skin which I have seen in patients under its use, I am prepared to expect much more from it in proper cases than I was inclined to some years ago, or than most authors and practitioners experienced in cutaneous disorders are willing at the present time to admit. Whether I shall ever be able to indorse all that Mr. Thomas Hunt says of its action, I do not know ; but he was a careful and conscientious clinical student, and his vast experience should encourage us to study our cases, and, when arsenic is suitable, to induce the patient to persist in its use, scientifically and intelligently managed, until results are obtained.

Mr. Milton, of London, agrees¹ with Mr. Hunt in regard to the efficacy of arsenic in *lupus*, and, from the recommendations of these gentlemen, we must believe that it possesses some controlling power over the disease, although other authors speak quite differently on the subject. Direct proof by capable witnesses must outweigh negative proof, however good ; and the cases detailed by Hunt and Milton certainly encourage us to use this remedy in a disease which, though happily rare in this country, is exceedingly rebellious even here. I have used arsenic somewhat in *lupus*, but it was never faithfully tried, when compared to its use in Hunt's cases ; and I am not willing that my negative testimony should have any bearing in the matter. Hunt states that, "in healthy subjects, arsenic internally administered is a specific" for *lupus exedens*, and that, in the non-ulcerating form, it will slowly arrest and modify the disease, and in some cases cure it ; this without local applications. But, in one of his cases, arsenic was taken for two years with "*no appreciable improvement in the ulcer-*

¹ "The Pathology and Treatment of Diseases of the Skin." London, 1874.

ated surfaces,"¹ while, during the third year, the lupus healed entirely; it had already carried away much of the nose, upper lip, and gums of the upper jaw. Other cases yielded much sooner. Milton regards arsenic as the only remedy in lupus of the head or face, and thinks that the dose should be very large, so as to bring on a certain amount of constitutional disturbance.

There are few diseases requiring more widely different treatment than chronic *urticaria*, but there is good authority for saying that arsenic will control it when due attention has been paid to the removal of exciting causes.

Arsenic is certainly useful in the forms of disease coming under the head of *lichen*, that is, in its more chronic forms, although alkalies and other remedies are constantly called for as well. The ordinary chronic lichen, or lichen agrius, as described by older writers, and still recognized as distinct from eczema by the French and many of the English, and which I meet with constantly, yields very promptly to arsenic. In the *lichen ruber*, a rare disease in this country, but perfectly described by Hebra, the latter states² that there is no internal or external remedy which has appeared to influence the disease to the slightest degree except arsenic, and, on the other hand, that this remedy has never failed in cases in which it has been given in sufficient quantity. According to Hebra, it is necessary to administer it for many months—six to eighteen—not only until the disappearance of the disease, but for some time thereafter. He uses the Asiatic pills (to be described later), beginning with three daily, and increasing gradually up to ten or twelve a day, at which dose the arsenic is to be continued for months, and then reduced to six pills daily. "In this manner," says he, "some patients, even children from twelve to thirteen years old, have taken in the course of some months or years as many as thirty-five hundred Asiatic pills, equivalent to three hundred and fifty grains of arsenious acid, with the effect of removing the lichen ruber and restoring the nutrition of the body to a normal state.

¹ "A Guide to the Treatment of Diseases of the Skin," 8th edition. London, 1865, p. 164.

² "Lehrbuch der Hautkrankheiten." Zweite Aufl., Erlangen, 1874, p. 397.

We have never seen," continues he, "any ill effects therefrom. But little effect is produced upon the disease before the expiration of six weeks, and the use of from four to six hundred pills." Such statements, coming from Hebra, who is known chiefly by his disregard of internal remedies in treating diseases of the skin, are of interest and value.

I cannot further dwell on the special diseases of the skin in which arsenic has been prescribed, and for which it is recommended by those who have used the drug most, as Mr. Hunt, but may briefly mention them. *Ichthyosis*, in which others have found arsenic to fail, is said by Mr. Hunt to yield perfectly to it. I have exhibited it to several mild cases, more properly called *xeroderma*, and for a considerable length of time, without observing any effect from it, and should be inclined to doubt if it could ever affect the disease favorably. Hunt also reports most favorably of the use of arsenic in *sycosis*, and I have found it of decided service; that is, of course, in the form of sycosis which is not produced by a parasite. In an old and very obstinate case in a man aged thirty, arsenic in the form of De Valangin's solution, increased slowly until forty drops were taken three times a day, held the disease in check very perfectly, as was shown repeatedly when he omitted taking it for a little time, when the irritation would return and the disease increase. Epilation and other means of treatment were used, but the controlling power of the arsenic was manifest throughout the case. I will state, however, that the dose of forty drops of De Valangin was not well borne, but thirty-five drops three times a day were well tolerated. Finally Mr. Milton and Mr. Hunt, and perhaps others, declare that arsenic has great power over *warts*, especially when seated on the face. I have observed this to be true in one case; certainly some of the warts disappeared from the face quite rapidly without any other treatment save arsenic internally.

Having mentioned the diseases in which we may, on good authority, order arsenic with a fair prospect of having favorable results, I will briefly state in what affections the remedy is useless or harmful; we will then consider for a moment the physiological action of arsenic as distinguished from its toxic

effects, examining then the dangers to be apprehended ; later its preparations and their doses ; and finally will mention certain rules to be observed in administering this potent remedy.

First, then, syphilis in all its forms is uninfluenced by arsenic, except badly, and it should never be given unless called for by nervous symptoms or as a stomach tonic. The parasitic diseases, animal and vegetable, are equally beyond the power of arsenic ; but here there is an exception, namely, that in certain cases of *tinea circinata* and *tonsurans*, the ring-worm of the body and head, and in *favus*, where the disease is old, general, and deep-seated, arsenic may, by improving the nutrition of the skin, render it an unfit soil for the vegetable parasite to flourish in ; ordinarily, however, its administration is entirely unnecessary.

Elephantiasis Græcorum, or true leprosy, cannot be benefited by arsenic. I do not know of its having been tried in the elephant leg or *pachydermia*, but presume that no results have been obtained, or we should have learned of it, the disease being so notoriously rebellious. Purpura, true prurigo, herpes zoster, scleroderma, molluscum contagiosum and fibrosum, keloid, and nævus, are all uninfluenced by arsenic, although Hunt gives a case of the latter which he states was cured by this mineral internally. In regard to cancerous diseases of the skin, and especially epithelioma and rodent ulcer, there is still some room for doubt, as certain authors think that they have seen benefit from the internal administration of arsenic in them.

And in this connection I may state concisely what I consider to be the present standpoint in regard to the external use of arsenic, and that especially in reference to the last-mentioned disease, epithelioma. There are two points of very great importance to be remembered in prescribing it locally, and these are, either to make the applications so weak and apply them so sparingly that no absorption can take place, or else, by a bold stroke, to apply the arsenic of such a strength as to kill at once the tissue, and so prevent absorption. Of the former I will not speak, as I have never yet used, and probably never shall employ, mild preparations externally, for we may not know where absorption has taken place until too late.

I may say, however, that it is altogether unjustifiable to use weak solutions or ointments of arsenic for the cure of the animal or vegetable parasite diseases, or as stimulants to large ulcerated surfaces, as has been done with alarming results. Stillé¹ gives some interesting particulars in regard to the dangers from the external application of arsenic, and there have been many fatal cases reported from the poison thus used.

But of the latter method I can speak with great assurance. I refer to that practised very largely, and recommended very earnestly by Marsden² in the treatment of certain forms of cancer, and to which my attention was called some years since by my friend Dr. Daniel Lewis, of New York, who afterward published some seven cases treated in this way.³ Marsden recommends two drachms of powdered arsenious acid, with one of mucilage of gum acacia, to be mixed together and made into a thick paste. I have prepared it extemporaneously, using equal parts by weight of the white arsenic and powdered gum acacia, which I mix thoroughly, and then moisten with a drop or two of water at the time of application. This is to be spread on an epitheliomatous growth to an extent not exceeding a square inch at one application, according to Marsden (I have never used it to so large a space). When there is a large growth to be destroyed, successive portions may be attacked. A little cotton or lint is then packed on, the mass allowed to harden, and after eight or ten hours (Marsden says forty-eight) a flaxseed poultice is to be applied, and changed every two or three hours till the slough separates, which may occur in the course of a few days, sometimes not for two weeks or more. After this I continue poulticing the ulcer which is left, renewing the dressing every four hours, till perfect skin is formed, unless, as will sometimes occur, the destruction has not been deep enough, when the arsenical paste must be reapplied. The rationale is, as before stated, that absorption is prevented by the great strength of the application, and Marsden has never known

¹ "Therapeutics and Materia Medica." Philadelphia, 1864, vol. ii., p. 700.

² "On a New and Successful Mode of treating Certain Forms of Cancer." 2d ed. London, 1874, p. 83.

³ *American Practitioner*, December, 1874.

serious consequences from it. I have employed it repeatedly during the last three or four years, and consider it perfectly safe when used as described; I would, however, advise the reading of Marsden's little book before the treatment is entered upon. I hesitate to speak of other strong preparations of arsenic for external application, for which there are many formulæ recommended, because I have never used them, and, although my fears of absorption from weaker preparations than the one I have mentioned may be too great, I prefer to err on the safe side, and would, therefore, refer those interested to the various standard authors for an account of their preparation and use.

A moment may now be given to the physiological and toxic effects of arsenic preparatory to a study of its preparations and doses, and the rules for administering it. The immediate poisonous effects of large doses of arsenic are familiar to all, and need not occupy us here; death occurs, as is known, from paralysis of the heart, where very large quantities are absorbed, or, there is inflammation of one or more of the abdominal viscera, which may prove fatal; or, there may be some later affection of the nervous system—paralysis, etc.—which sometimes terminates life; these results are proportionate to the quantity taken, or rather the amount absorbed. Taylor states the smallest fatal dose at 2 grains, Tardieu at 1.54 to 2.31 grains.¹ The symptoms, of course, vary with the case, but in the main they can be divided into the three classes above given when death is the result.

Now, what do we know with reference to poisoning by the slower introduction of the mineral, or when the effect is produced by other than a single large dose introduced into the stomach? The symptoms given by Stillé,² in cases where nine men swept up some arsenic scattered in the hold of a vessel, were as follows: several were seized with vertigo and fell senseless; they were then attacked with vomiting and other symptoms of arsenical poisoning; two or three of the

¹ Wood. "A Treatise on Therapeutics." 2d ed. Philadelphia, 1876, p. 363.

² "Therapeutics and Materia Medica." 2d ed. Philadelphia, 1864, vol. ii., p. 702.

nine cases proved fatal in a few days. From arsenical fumes the following symptoms have been observed: debility, dyspnoea, præcordial pains and constriction, with severe cough, headache, pains in the limbs, muscular spasms and paralysis, thirst, nausea, vomiting, dryness of the mouth and fauces, and colic. Similar effects to a greater or less degree have been recorded as resulting from green paper-hangings on rooms,¹ also from certain colorings used in the manufacture of artificial flowers, fancy boxes, etc. Articles of dress have likewise been found to contain sufficient arsenic as a dye or mordant to produce the same in milder degree.²

I have seen similar conditions in the case of a woman who sat in a room which had been well strewn with Paris-green to destroy vermin. I have very recently met with a most interesting case where almost the first sign of arsenical poisoning was the development of a small, discrete pustular eruption, tending to ulceration on the arms and legs; all the other ordinary symptoms appeared shortly thereafter. The patient was a powerful, healthy man, who had been for one week employed in handling Paris-green, dealing it out in large quantities, principally for use against potato-bugs. He worked very hard and sweated profusely, and the room was constantly filled with the dust of the arsenic. At the end of the week he was completely prostrated. The subject of the dangers of the use of arsenic in agriculture has been considered very fully by Dr. Kedzie, of Michigan,³ and is one which health authorities should take cognizance of.

Let us now turn to see if any such symptoms as those described are ever, or need be ever, called forth when arsenic is given medicinally and guided by an intelligent hand. There is always a physiological warning given by arsenic when thera-

¹ For an account of the dangers from arsenical wall-papers, see Dr. Kedzie's report, "Second Annual Report of the Secretary of State Board of Health of Michigan." Lansing, 1875, p. 55. Also, an article by Dr. Brown, of Boston, *Boston Medical and Surgical Journal*, May 11, 1876, pp. 529 and 544.

² *British Medical Journal*, November 21, 1874 (*Monthly Abstract of Medical Science*, January, 1875, p. 45).

³ "Third Annual Report of Michigan State Board of Health." Lansing, 1876, p. 13.

peutically administered, which I do not find regarded by any one as one of its toxical effects, and that is the affection of the conjunctiva, with which all are conversant. After the administration for a while of a full medicinal dose, say from three to five drops of Fowler's solution, or more, that is, from $\frac{1}{40}$ to $\frac{1}{24}$ of a grain of white arsenic three times a day, a prickling sensation is felt in the tarsi, and the conjunctiva becomes slightly inflamed, especially at its middle zone, and on the inside of the lower lid, and there occurs some puffiness beneath the eyes. Hunt, whose experience in arsenic probably surpasses by far that of any other practitioner, states that this slight conjunctivitis takes the precedence of more grave symptoms in about forty-nine cases out of every fifty.¹ Gailleton also confirms this.² Hunt further says, "both the safety of the patient and the prospect of his recovery will depend upon the vigilance with which this fact inspires the surgeon. Ignorance of the existence of this safety-valve has caused many a cautious practitioner to repudiate the medicine altogether; and an acquaintance with this important sign would, doubtless, on the other hand, have checked the temerity which, in its results, has attained with unmerited suspicion the reputation of a valuable remedy."

It is needless to remind you that there is not the slightest danger to be apprehended from this slight conjunctivitis, which passes away spontaneously on a cessation of the remedy or lowering of the dose. It is often necessary to continue the conjunctival irritation for a long time, but it need never be carried to such an extent as to cause much physical uneasiness to the patient.

All observers who have studied the effects of arsenic in medicinal doses agree that the other symptoms liable to occur are as follows: a certain amount of nausea, and occasionally vomiting, when an overdose is reached, or even a slight diar-

¹ "A Guide to the Treatment of Diseases of the Skin." 8th ed. London, 1865, p. 119.

² "Traité Élémentaire des Maladies de la Peau." Paris, 1874, p. 67. This is likewise shown in the elaborate study of arsenic by Imbert-Gourbeyre, "Études sur quelques Symptômes de l'Arsenic et les Eaux Minérales Arsénifères." Paris, Delahaye, 1863.

rhœa, possibly a little fullness of the head, and constriction of the chest, and very occasionally tingling of the extremities, and anorexia. All these, however, are trivial, and pass away with the suspension of the remedy. Some writers describe a number of eruptions occurring from arsenic—erythema, urticaria, herpes zoster, furuncles, etc.—but none of these are common; I have never met with them among the hundreds to whom I have given arsenic. I have, it is true, seen an acute papular eruption affecting the upper part of the body when taking arsenic for localized eczema elsewhere, but cannot believe that it was other than an acute papular eczema, there being no other signs of an overdose of the mineral. I have also seen herpes zoster develop while under arsenic, but neither can I attribute this eruption to the drug for the same and other obvious reasons. I have already recorded a general pustular eruption in a patient poisoned by arsenic, but much of this was local, on parts exposed to the dust of the Paris-green.

The only pathological change in the skin produced by arsenic taken medicinally, which is at all common, I believe to be the brown, pityriasic staining, described as a dingy, unwashed appearance, affecting the protected parts of the body. As far as I have observed it, it appears to resemble somewhat the ordinary chloasma, though less marked, found also in those who have taken no arsenic; undoubtedly in some instances both chloasma and the brownish tinea, or pityriasis versicolor, the parasitic disease, have been mistaken for it.

Finally, Weir Mitchel,¹ eleven years ago, reported two cases, one of which was very striking, where a temporary albuminuria attended the œdema following arsenic used therapeutically, but I have not been able to find any further illustrations of this by others.

The question now arises whether there is any danger to the general health from the long-continued use of this drug even in medicinal doses, a question continually asked by patients when aware that they are taking arsenic, and one of vital importance to the practitioner as well. Hunt reports,²

¹ NEW YORK MEDICAL JOURNAL, vol. i., 1865, p. 169.

² *Journal of Cutaneous Medicine*, vol. ii., pp. 144, 249, 350.

from a survey of upwards of fifteen thousand recorded cases, and after having administered not less than five hundred gallons of arsenical solution in ten years' dispensary practice alone, that he has never seen any deleterious effects. Some of the patients took arsenic almost continuously for seven years together and not one with a result to be regretted. Says he,¹ "I have now administered arsenic for months or years together in many thousands of cases, and have watched in vain for the alarming effects attributed to its use. During more than thirty years' observation I have rarely known it to produce any unpleasant effects on the system in a degree incompatible with perseverance in its use; and I have taken pains to make extensive inquiries among more than a hundred of my professional brethren most familiar with its use. The British Medical Association, in 1848, addressed questions to its members and obtained replies from seventy-five practitioners who had used arsenic largely as a medicine and whose cases amounted in the aggregate to several thousands. Yet, in their answers to special inquiries, it appeared that not one of these practitioners had ever found the medicine either fatal or permanently detrimental to health." I have already given Hebra's experience with arsenic in lichen ruber in very large doses and for long periods, with only benefit to the patient's health; more than half an ounce in all of arsenious acid having been taken by a single patient. I may mention that in psoriasis he continues the same treatment for months,² and states that many patients have taken as high as two thousand pills, containing a total of two hundred grains of arsenic. Veil³ reports the use of arsenic in seven hundred cases of skin-disease without a single untoward symptom or result. Romberg, who used arsenic greatly in nervous diseases, says:⁴ "The proper precautions being used, I have never seen the slightest evil result occur, even in children, from the use of arsenic."

¹ "Diseases of the Skin," eighth edition. London, 1865, p. 16.

² "Lehrbuch der Hautkrankheiten." Zweite Aufl., 1874, Bd. I., p. 365.

³ "Würtemb. Corr. Bltt.," No. 24, 1860. (Sydenham Year-Book, 1862, p. 415.)

⁴ "A Manual of the Nervous Diseases of Man." Syden. edition. London, 1853, vol. ii., p. 74.

Hunt states in italics, that "*the reputation of arsenic as a slow poison in medicinal doses rests upon no evidence whatever.*"

A demonstration of the safety of arsenic, when taken in quantities suited to the system, is found in the practice of arsenic-eating in Styria,¹ the verity of which is accepted by Stillé,² and which has been recently confirmed by Dr. Knapp.³ This latter gentleman saw a healthy man of seventy, who had taken arsenic for forty years, and reports other very interesting points in regard to the tolerance of the mineral.

Another illustration of the safety of arsenic, suggested by Mr. Hunt, is as follows: The medicinal dose of arsenic averages one-twenty-fourth of a grain, and the smallest recorded fatal dose is two grains, or about fifty times the amount generally required in medicine. There is no other remedy where such a proportion is borne; imagine the effect of fifty times the dose of any ordinary medicine, or two to five hundred grains of calomel, fifty to one hundred of opium, thirty ounces of sulphate of magnesia, fifteen or twenty grains of morphia, half an ounce of quinia, and so on.

Space and time forbid my seeking further proof of the safety of arsenic when properly administered, and I will only add that I have prescribed it myself in very many cases for the past eight years, and have yet to regret its use. I have glanced over my public and private records during the past year and a half, and find that I have ordered it for between two and three hundred patients during this period, in quantities varying from the minimum dose to forty drops of De Valangin's solution and twenty of Fowler. I have always directed it to be taken three times a day; in many instances it has been continued for months, and I have patients who have taken it for years, not only without injury to the health, but generally with

¹ *Edinburgh Medical Journal*, June, 1860, p. 1137; and *Medical Times and Gazette*, November 17, 1860, p. 494. ("Sydenham Year-Book," London, 1861, p. 61.)

² "Therapeutics and Materia Medica." Second edition. Philadelphia, 1864, vol. ii., p. 704.

³ "Versamm. deut. Naturf. u. Aerzte zu Graz," *Allg. Med. Chir. Zeitung*, Beilage zu No. 97, December 4, 1875. (*Boston Medical and Surgical Journal*, May 11, 1876, p. 546.)

marked benefit. The youngest patient to whom I have administered arsenic during the last year and a half was aged three and a half months, and I find many recorded at four and five months of age, and from that upward. I am aware that Ringer¹ gives a more serious picture of the effects of long-continued doses of arsenic, but I cannot imagine that he has reference to its therapeutic use by intelligent physicians; if so, where does he obtain his clinical evidence? It will be understood, of course, when I speak of the safety of arsenic, that it is in proper doses suited to the particular individual, for, as mentioned elsewhere, the dose is not always the same, and it is also with the understanding that the rules for its administration are followed, and that the earlier manifestations of its physiological action are always heeded, otherwise serious results may occur, which is true as well of any other medicine. It is not to be denied that serious results have followed the use of arsenic as a medicine,² but to a less degree, I firmly believe, than is true of any other remedy of equal potency.

Arsenic is eliminated very rapidly, chiefly by the bowels and kidneys. Majer states³ that arsenic always appears in the urine from six to twelve hours after a dose, and disappears in four to six days after leaving off the remedy. Two-thirds of the quantity taken is thus excreted. Hunt states that, in the case of a man who had taken arsenic for about a year, no trace of the mineral could be found on careful analysis of the body after death, which occurred two weeks after the last dose. Bodies of animals examined by Danzer and Flaudin three days after the last dose of arsenic, of which fifteen grains had been given daily, gave no trace of the drug.⁴

The United States Pharmacopœia⁵ recognizes seven forms of arsenic, as follows: arsenicum, acidum arseniosum, arsenici iodidum, liquor arsenici et hydrargyri iodidi, liquor arsenici

¹ "A Hand-book of Therapeutics." Third edition. New York, 1872, p. 236.

² Stillé, *loc. cit.*, vol. ii., p. 705.

³ *Würtemb. Med. Corresp. Bl.*, No. 13. ("Sydenham Year-Book," London, 1862, p. 230.)

⁴ *Journal of Cutaneous Medicine*, vol. ii., p. 149.

⁵ Fifth revision, 1874.

chloridi, liquor potassæ arsenitis, and liquor sodæ arsenitis; besides these, there are found in the Dispensatory:¹ arsenic acid, arseniate of ammonia, of iron, and of quinia, also the bi-sulphuret and ter-sulphuret of arsenic.

The metal arsenic is not given internally. Arsenious acid seems to be borne in larger doses when given alone than when combined with alkalies or acids, and, according to Hebra, the dose of one-tenth grain may be given in pill three times daily, increased, as we have seen, by him, to ten or twelve such pills in the twenty-four hours. Arsenic is usually given in this form in the East, and Hebra rarely employs any other. It is a safe and often convenient form in which to give arsenic, but is seldom employed in this country or in England. Hebra's formula for Asiatic pills² is to mix sixty grains of arsenious acid with six drachms of powdered black pepper, and divide the mass into six hundred pills, each thus representing one-tenth of a grain of arsenic. Neumann gives this prescription:³ arsenious acid sixty-six grains, black pepper nine drachms, divide into eight hundred pills; each pill containing .08, or about $\frac{1}{12}$ grain of arsenious acid. Neligan states⁴ that each Asiatic pill should contain about one-thirteenth grain. As no formula is given in the Dispensatory, care must be exercised, in ordering Asiatic pills, to state the quantity in each; it were safer to commence with a smaller dose than Hebra gives. Frequently arsenious acid is better tolerated when combined with opium, thus: *R. Acid. arsen., gr. j; pulv. opii, gr. iv. M. Div. in pil. No. xvi.* When used in solution, arsenious acid should be ordered first, in the dose of one-twentieth grain, three times daily.

The iodide of arsenic is seldom now used internally, although the late Dr. A. T. Thompson prized it, and Neligan⁵

¹ "The Dispensatory of the United States of America." Twelfth edition. Philadelphia, 1867.

² "Lehrbuch der Hautkrankheiten." Zweite Aufl., Erlangen, 1874, Band I., p. 365.

³ "Lehrbuch der Hautkrankheiten." Third edition. Wien, 1873, p. 266.

⁴ "A Practical Treatise on Diseases of the Skin." Philadelphia, 1852, p. 186.

⁵ *Loc. cit.*, p. 185.

recommends highly what he calls the ioduretted solution of the iodide of potassium and arsenic, after the following formula: \mathcal{R} . Liq. potass. arsenit., \mathfrak{m} lxxx; potass. iod., gr. xvi; iodi. pur., gr. iv.; syr. flor. aurant., \mathfrak{z} ij. \mathcal{M} . Each drachm of this contains five minims of Fowler's solution. Iodide of arsenic may be well given in pill form, one-twelfth to one-eighth grain, gradually increased.

Of the next officinal preparation of arsenic, Donovan's solution, the liquor arsenici et hydrargyri iodidi, Mr. Hunt remarks: "If there be any medicine more dangerous and unmanageable than another, it is that villainous compound of arsenic, iodine, and mercury, known by the name of Donovan's solution," an opinion which many others share. I never prescribe it, for I have abundantly witnessed its inefficacy and ill effects in patients who have taken it previous to coming under my care.

The liquor arsenici chloridi, recently admitted into our Pharmacopœia, is intended to replace the old English preparation frequently referred to in this paper, De Valangin's solution of the chloride of arsenic, the *solutio solventis mineralis*. The formula for this latter was given in the twelfth edition of the Dispensatory, 1867, under the present title, liquor arsenici chloridi, but its strength is only about one-third that of the accepted officinal solution. I would call especial attention to this fact, as all my cases here referred to, and those mentioned by Hunt, Milton, Gaskoin,¹ and perhaps others, were treated by the solution made from the old formula, where there is only one and a half grains to the ounce, and twenty minims contained but one-sixteenth of a grain of arsenic; whereas the present solution is of the strength of four grains to the ounce, to correspond with the other arsenical solutions, and twenty minims represents one-sixth grain, instead of one-sixteenth, as heretofore. I will also direct attention to the formula for the liquor sodæ arsenitis, which is now fixed at four grains to the ounce, while Pearson's solution, as originally used, contained but one grain to the ounce, or one-fourth the present officinal amount. We cannot be too careful in handling severe and potent remedies.

¹ "On the Psoriasis or Lepra." London, 1875.

De Valangin's solution, or the liquor arsenici chloridi, I consider, in some respects, to be the best form in which to introduce arsenic into the system, although I would by no means neglect other preparations, and this solution is much recommended by Hunt, Milton, and Gaskoin, and Wilson places it first in his formulæ for arsenical remedies. The reason of its superior efficacy is probably because the arsenic is united with hydrochloric acid, which corresponds to the normal stomach acidity.

These three officinal solutions, just mentioned, being of equal strength, we may consider their action together: they are, I believe, each one suited to fulfill different ends, and are all of great value. I will introduce into this group a fourth preparation, now almost forgotten, but used with advantage by Biett, and which will, on occasion, serve a good end, namely, the arseniate of ammonia. It is described in the Dispensatory, where a solution of a grain to the ounce is directed, of which from twenty to twenty-five drops may be given; it were better to make the solution of the same strength as the others, four grains to the ounce, and prescribe it in the same doses as the other solutions.

The liquor arsenici chloridi, then, is of more especial service where an acid is called for by the general state of the system, and it may often be advantageously combined with muriatic and nitro-muriatic acid, also with the muriated tincture of iron. Fowler's solution is applicable where potash salts are required, and is often very happily united in the same prescription with liquor potassæ, acetate of potassa, etc.; the solution of the acetate of soda is the same in reference to soda salts, and the arseniate of ammonia has its functions to fulfill, when salts of ammonia are wanted, and may be well prescribed with the aromatic spirits of ammonia, liquor ammoniæ acetatis, etc. Now, it is no idle matter, whether a patient with a disease of the skin receives muriatic acid, potassa, soda, or one of the salts of ammonia; and I believe we will get far better results if we will have more in respect the state of the system at large and its demands. For this reason, therefore, I think we should study a case of skin-disease, and, when we deter-

mine that arsenic is called for, seek that preparation best adapted to the exigencies of the case.

To conclude the list of the preparations of arsenic and their uses: Arsenic acid has therapeutic effects similar to those of arsenious acid, but is more poisonous; the dose is one-twentieth of a grain, in aqueous solution, but I do not know of its having been ever prescribed in diseases of the skin; Garrod believes¹ that it is less irritating to the stomach, and can be prescribed in larger quantities than other preparations. Of the arseniates of iron and quinia I cannot speak from experience, and can find but little in regard to their use;² the former is officinal in the British Pharmacopœia, and the formulæ for both are found in the United States Dispensatory. Good results might be expected from these combinations, but the iron and quinia are in such small quantities that their action must be quite insignificant. The dose of the arseniate of iron is from one-tenth to one-eighth of a grain, in pill, three times daily; of the arsenite of quinia, one-third of a grain may be given at once. I do not know of either the bi- or ter-sulphuret of arsenic being used internally in skin-disease; the latter orpiment, or King's yellow, is employed considerably as an ingredient of depilatory powders, and is quite safe when thus used under medical guidance.

A new preparation of arsenic has recently been introduced, especially in the treatment of nervous affections, in which phosphorus is combined with the chloride of arsenic, after the following formula by Routh: *R.* Acidi arseniosi, gr. j; phosphori, gr. one-sixth; acidi hydrochlor. dil., \bar{z} j. *M.* It is known as the solution of the chloro-phosphide of arsenic, the dose being, for an adult, fifteen to twenty minims, thrice daily. It promises well in diseases of the skin of a nervous type. The arseniate of antimony has been employed in certain diseases, but I have not yet learned of its use in those affecting the skin.

A word may now be said, in general, relative to the dose

¹ Reynolds's "System of Medicine," Philadelphia, 1868, vol. i., article "Gout," p. 887.

² Duchesne Duparc. *Gazette des Hôpitaux*. (*Braithwaite's Retrospect*, January, 1855, part xxx., p. 175.)

and mode of administering arsenic. The common practice, as is well known, is to give a small dose at first, say three drops, more or less, of Fowler's solution, or its equivalent, and then to increase the dose slowly until some of the physiological symptoms are manifested; then to lower the dose just sufficiently that it may be well tolerated. This is the plan recommended by many authors, and is the one which I have often followed, as is shown in the cases detailed. But Hunt, who is so justly quoted in everything pertaining to arsenic, regards the rapid increasing of the doses, recommended by some, as a serious error, and proceeds in an exactly opposite manner. He orders a pretty full dose, say, five minims of Fowler, at once, and persists in it for a fortnight or three weeks, and, if it produces no sensible effects, he then increases, say, by one-fifth of the dose once or twice a month until the remedy begins to assert itself, when the full dose may be considered as arrived at, and is to be persevered in without further increase. He does not produce any great amount of disturbance, but does keep the eyes slightly tender. A third plan is, to give only small doses, not sufficient to produce any of the symptoms of arsenic, and to continue them without increasing.

Hunt's plan does not differ much from that first mentioned, except that he gives larger doses at first, and increases more slowly. Inasmuch as some persons are readily affected by arsenic, it is safer, I think, to commence with the smaller dose, and not to increase very rapidly. I believe, however, that very commonly all the effects of the drug can be obtained from small doses, long persisted in, without much increase.

I have never met with any of those cases which are said to be so very susceptible to the action of arsenic, although such undoubtedly exist, and it must always be borne in mind that the dose of arsenic may vary for different individuals and cases, just as does that of any other remedy. Mr. Hunt has known one-fourth of a minim of Fowler's solution, thrice daily, to cure psoriasis in a delicate female, whereas some patients, as in the instances I have given, tolerate very large doses with impunity and with benefit.

But arsenic, when administered medicinally, should be taken with the utmost regularity, and I most earnestly in-

dorse the following, from Mr. Milton: ¹ "The plan, once decided upon, should be regularly and consistently carried out, and, if any interruptions be thought requisite, they should only be made on really valid grounds, and be as systematic as the rules for taking the medicine. The surgeon may often suspend the arsenic with advantage; the suspension of it by the patient without orders can scarcely fail, sooner or later, to retard the cure. If the patient will give up arsenic whenever he is going out to see his friends or when he has friends coming to see him, when he is away on business or pleasure, when he is tired of taking medicine or fancies that it may not agree with him, in short, if he will take it in any way but the right way, he had better not take it at all."

Arsenic should never be intrusted to a patient for a long time to use at his own discretion; those taking it should be carefully watched and seen very often; some insist on seeing patients who are under its use every few days, and seldom should the intervals of time be marked by weeks, never by months; for, while in very many instances all is well and no change need be made, the medical judgment alone can tell if the effects are bad or good, for it is not possible to foreknow its action in every case.

It is often advisable and necessary to give arsenic in a concealed form, for many patients who have once tried it, however unfaithfully, will not have confidence in it again, and many will fancy that they cannot take it, or if they are aware of its use they very readily imagine many of the symptoms which are liable to occur. We are, therefore, justified in concealing the fact, if possible, for, as McCall Anderson remarks, ² "All that our patients can ask of us is, to do everything in our power to benefit them," and I myself cannot see wherein it concerns them what the remedy is.

For this and other reasons it will often be convenient to give arsenic in pill-form. Any of the solutions may be thus prescribed very conveniently by having the requisite quantity

¹ "The Pathology and Treatment of Diseases of the Skin," London, 1872, p. 6.

² "A Practical Treatise on Eczema," etc., third edition, London, 1874, p. 103.

of the liquid for a given number of pills mixed with some inert powder or with other ingredients, so as to make a soft paste; this may then be dried on a water-bath until of proper consistence, and afterward be divided into the desired number of pills. I have used this method of administering arsenic considerably, and am much pleased with it; I thought the idea was original to myself alone, but I find that Gaskoin mentions it in regard to Fowler's solution. Arsenious acid is furnished in pill-form in various doses, alone and combined with other remedies, by some of our manufacturing chemists, and some of the compound formulæ might be of service when it is desirable to give arsenic unknown to the patient.

Arsenic should always be given with or immediately after meals and not before, as the habit with some is. (There are, of course, exceptions to this rule, as we know that in certain forms of dyspepsia it answers best on an empty stomach.) I much prefer administering it during the meals, and I have the dose placed in the glass of water which is to be drunk during the meal, or in a separate wineglass. For this reason it is often better to separate the arsenic and put it in a watery solution, say of a strength so that ten drops or minims shall contain one of the arsenical preparation, then thirty, thirty-five, forty, forty-five, and so on, minims may be given. By this means the dose is varied with greater exactness than if the arsenic alone was dropped out; also there is less danger of mistake, as each minim represents but one-tenth the amount of the pure solution. Arsenic should never be given to the patient in the pure officinal solution, with directions to drop it out, as the drops vary so much with the size and shape of the edge from which it is dropped; in the plan proposed of giving it diluted, it is also much better to insist upon the patient having a minim glass and measuring the dose. It will sometimes be of advantage to add a small amount of an appropriate acid or alkali to each dose; thus the remedy is given in a form much like the natural arsenical waters, with which I have no personal experience, but which are highly prized by some.¹ I agree most heartily with many other writers in

¹ "Note sur le Traitement de l'Eczéma et du Psoriasis aux Eaux Arsénicales de la Bourboule," Paris, Asselin., 1876; also Wilson, "On Diseases

omitting the nauseous and useless compound tincture of lavender from Fowler's solution.

One more method of administering arsenic remains to be mentioned, and that is, by hypodermic injection. This has been safely and successfully practised by Lipp,¹ in psoriasis and chronic eczema, who used arsenious acid dissolved in distilled water, with heat (gr. iv ad ʒj). He injected from one-twentieth to one-fifth of a grain once daily, or omitting a day or two, and obtained the distinct, constitutional effects of arsenic from the larger doses; the smaller doses were quite safe. There were no abscesses, and but moderate inflammatory action at the site of puncture. Radcliffe² injected Fowler's solution about every other day, increasing the dose from five to fourteen minims, with the result of curing chorea; and in neuralgia the same was injected in doses increasing from ten to thirty minims. This method may prove useful in some cases of skin-disease, as in severe pemphigus, threatening life, where the drug could not be given internally; also in other diseases where the stomach will not retain it, or where it fails to act when introduced by this channel.

In regard to the principles or rules to be observed in the use of arsenic therapeutically, they may, in the main, with what has preceded, be summed up as follows:

1. Arsenic, when administered in medicinal doses, has quite another action from that manifested by poisonous doses; the average dose of the former is one twenty-fourth of a grain of arsenious acid, while the smallest toxic dose is stated at two grains.

2. Arsenic in medicinal doses does not produce any slow poisoning, but has been administered for months or years in quantities a small portion of whose aggregate amount would destroy life at once. Hebra has administered a total of more

of the Skin," London, 1867, p. 125; also, Diday and Doyon, "Thérapeutique des Maladies Vénériennes et des Maladies Cutanées. Paris, Masson, 1876, p. 870.

¹ *Archiv für Dermatol. und Syph.*, vol. i., p. 362.

² Waring's "Practical Therapeutics," Philadelphia, 1874, third edition, p. 108.

than half an ounce to a single patient. The accounts of the toxiphagi of Styria are true, and arsenic is eaten by some for many years without apparent ill effect.

3. Arsenic given by a careful practitioner, in doses to be effective, need never produce any symptoms which should cause regret.

4. Arsenic is eliminated very rapidly, chiefly by the bowels and kidneys, so that the urine shows evidences of it in a few hours; no trace of it can be found on careful analysis of the body after death, two weeks after the last dose of arsenic.

5. Arsenic, therefore, does not accumulate in the system, and no fear of this need be entertained; but when it is administered in increasing doses absorption may be hindered, and, when the doses become very large, active absorption of the large dose may give rise to a suspicion of cumulative action.

6. The first symptom of a full dose of arsenic, in a very large share of cases, is a fullness about the face and eyes, and conjunctival irritation and tenderness. This need not be exceeded, but may often be kept up with advantage to a slight degree till the disease yields. Before any harm is done by the arsenic, either this or a slight nausea or diarrhoea manifests itself.

7. Arsenic should always be given with or just after meals; it is often best to give it alone, or with a small amount of bitter infusion.

8. The bowels should be first well purged, and an occasional laxative will both assist the action of the drug and prevent or modify some of its unpleasant effects.

9. If the urine becomes loaded and the tongue coated, it is best to stop the medicine for a short time and give diuretics; some of these disturbances can be prevented by combining an alkali, as acetate of potassa, carbonate of soda, or aromatic spirits of ammonia, with the arsenic.

10. The most serviceable forms in which to use arsenic, named in the order of their value, are: solution of the chloride of arsenic, solution of the arseniate of potassa, that of the arseniate of soda, and the arseniate of ammonia, arsenious acid,

iodide of arsenic, and the arseniates of iron and quinia; of as yet untried efficacy, solution of the chloro-phosphide of arsenic and arseniate of antimony.

11. The dose of arsenic, small at first, is to be increased slowly until some of its physiological effects are manifested or the disease yields; it may then be somewhat diminished.

12. It is very important that arsenic be taken very regularly and persistently, and always under the supervision and frequent inspection of the physician.

13. Arsenic is valuable in chronic rheumatism, hence is useful in arthritic eruptions; it is serviceable in certain neuroses, as chorea and neuralgia, therefore in skin-diseases with neurotic elements; and it possesses anti-malarial properties, and is consequently serviceable in diseases of the skin showing periodic symptoms, as intermittent urticaria, etc., likewise in patients with other skin-diseases who have been exposed to miasmatic influences.

14. Arsenic is certainly valuable in psoriasis, eczema, pemphigus, acne, and lichen, in proper cases and when due regard is paid to the secretory organs, and to diet and other elements of general health; of less certain value in lupus, ichthyosis, sycosis, verruca and epitheliomatous and cancerous diseases; it is absolutely useless or harmful in the syphiloderma, the animal and vegetable parasitic diseases (except in rare cases), in elephantiasis Græcorum and Arabum, in purpura, true prurigo, herpes zoster, scleroderma, molluscum contagiosum and fibrosum, keloid, vitiligo, nævus, etc.

15. The only local application of arsenic which is justifiable is either one where the strength is so weak, and the extent of its use so small, that there is no danger from absorption, which may occur when not expected, or, one of such a strength as to kill the adjoining tissue at once, and so prevent absorption, as is the case with Marsden's mucilage.

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The author then proceeds to discuss the various factors that have shaped the development of the United States, including the role of the government, the influence of the economy, and the impact of the culture. The paper concludes by emphasizing the need for a continued study of the history of the United States in order to ensure a bright future for the nation.

The second part of the paper discusses the role of the government in the development of the United States. It is argued that the government has played a crucial role in shaping the nation's destiny, from the early days of settlement to the present. The author then discusses the various policies and programs that have been implemented by the government, and the impact of these on the development of the United States. The paper concludes by emphasizing the need for a continued study of the role of the government in the development of the United States in order to ensure a bright future for the nation.

The third part of the paper discusses the influence of the economy on the development of the United States. It is argued that the economy has played a crucial role in shaping the nation's destiny, from the early days of settlement to the present. The author then discusses the various factors that have influenced the development of the economy, including the role of the government, the influence of the culture, and the impact of the technology. The paper concludes by emphasizing the need for a continued study of the influence of the economy on the development of the United States in order to ensure a bright future for the nation.













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