alopecia, which showed no improvement, dermatitis herpetiformis, xanthoma, psoriasis, and lichen. The average duration for the cure of 20 cases of psoriasis was 29 days and for ten cases of lichen 25 days.⁶ Both these series were treated with external applications in addition. But cases of lichen treated exclusively with atoxyl all gave excellent results. The worst case required 42 injections. It was found that after a few injections the itching of the skin subsided, the papules became flatter and paler, the scaliness diminished, and finally nothing remained but a little faint pigmentation. In regard to psoriasis, the reports indicate that atoxyl must be supplemented by local remedies. After about six injections the infiltration becomes less and the scales decrease, but apparently a thorough cure cannot be relied upon. Guszman of Budapest,⁷ however, has achieved such remarkable success by the energetic use of atoxyl in psoriasis without any other treatment that he looks upon it as a specific. He points out the great advantage of this method of treatment when the use of baths and inunctions would be difficult. He agrees, however, that the employment of local measures distinctly expedites the cure. Atoxyl tends to increase the circulation in the cutaneous capillaries, and assists, therefore, in the absorption of pathological pigmentations such as chloasma. A case of xanthoma treated in Lassar's clinic⁸ exhibited flattening of the plaques after the fourth injection. The colour became less intense, and after 22 injections a perfect recovery ensued. Again, a young girl whose face was covered with yellow warts received nine injections of atoxyl on alternate days, and this sufficed to cause their absolute disappearance. A series of 18 injections resulted in the absorption of numerous subcutaneous endotheliomatous tumours in the case of a man aged 68 years.⁹ Naturally atoxyl has been applied to other general morbid conditions wherein arsenic finds a field for employment. The improvement in nutrition which follows the use of the cacodylates in pulmonary tuberculosis obtains also in the case of atoxyl. Cases of anæmia and chlorosis which appeared to resist iron treatment¹⁰ did well and finally became quite cured under a course of atoxyl. It should be noted that in these cases the first indications of improvement concerned the nervous symptoms of the disease, such as the headache, giddiness, and palpitation. Mendel has used the drug in neurasthenia, hysteria, facial paralysis, sciatica, and spasmodic asthma, and he regards it as a perfect substitute for arsenic. It is eminently applicable in chorea and is one of the most successful remedies for Graves's diseases. In three cases of this condition the symptoms practically subsided in from six to eight weeks. Atoxyl also finds an excellent application in the neurotic disturbances associated with the climacteric.

The very latest investigations into the action of this drug are concerned with the therapeutics of trypanosomiasis. It has been demonstrated by Laveran and Mesnil that arsenic kills the trypanosomes circulating in the blood. It can, however, only be relied upon to cure the disease in an animal which otherwise possesses great resisting power, because this lethal action of arsenic on the parasites ceases with the excretion of the drug or on its combination with the fixed tissue elements. It follows, therefore, that the trypanosomes which have not been destroyed continue to exist and multiply and circulate in the blood stream, as the examination of a film will prove. Atoxyl possesses the same action as arsenic, but can be pushed to a much greater extent than the latter. The following scheme indicates the specific action of atoxyl on the parasites when administered to an animal suffering from trypanosomiasis.¹¹

First 4 hours	...	No change.
4 to 5 hours	...	Trypanosomes swell; movements diminish.
7 hours	...	Movements slow; protoplasm in irregularly disposed granules, with ground-glass appearance and vacuolated. Shape of parasites deformed, but their number not greatly decreased.
8 hours	...	Sudden diminution in number, from 40 in a field to 3.
18 hours	...	Absolute disappearance; centrifugalised blood shows no parasites. A great increase of leucocytes.

There is a disease in horses, known as dourine, confined to

Algiers and North America, due to the trypanosoma equiperdum, as discovered by Rouget in 1894. The symptoms consist of inflammation of the genitals, œdema of the abdomen, eruptions, and inflamed glands. Wasting, anæmia, and paralysis follow. It has been clearly proved by experiments that the introduction of atoxyl into the blood absolutely prevents the development of the disease in susceptible animals as a result of inoculation.¹²

The reports of Robert Koch and others on the treatment of sleeping sickness by atoxyl are distinctly encouraging. In a recent report he records a trial of this drug in 986 cases of the mild and severe varieties. In the former class he included those patients who complained of impaired movement of the legs with pains therein and had swollen glands which contained the trypanosome. In the latter variety were included those who exhibited tremors, unsteady gait, going on to complete helplessness. After atoxyl injections the weakness gave way to increased power and very many of the patients were again able to walk about. Some desperate cases even lost their drowsiness, consciousness returned, and they improved so much as to walk about without assistance. So far authorities do not allow themselves to put their trust in atoxyl to effect a cure, but its therapeutical activity in that direction is undoubted.

There seems to be every prospect that this drug will acquire a permanent and very valuable position in the pharmacopœia. It should therefore be pointed out that idiosyncrasy to this drug may exist. A case is recorded of an adult who suffered from amaurosis, œdema of skin, and hyperkeratosis after the continued injection of atoxyl,¹³ but it is not clear whether the aniline may not have been concerned with the production of this untoward effect. Those who have had most experience of the use of atoxyl state that the only unpleasant results they have noted were dragging pains in the extremities, which, however, were quite evanescent.

Brondesbury, N.W.

THE BALNEOLOGICAL TREATMENT OF URINARY DISEASES.

BY DR. OSCAR KRAUS.

THE last few years have seen a notable change in the ideas dominating the field of balneology as well as in the domain of medicine in general. This is due to the fact that our views of physiological processes have been changing, that we are no longer prone to consider the human body as a chemical laboratory, pure and simple, that, on the contrary, we are now taking proper account of other non-chemical biological processes. As a result our views on the mechanism of the healing process and the indications for bath treatment and particularly on the "specificity" of the curative agents have become correspondingly clearer and more rational.

Purely external conditions assign to balneotherapy a field of action peculiarly its own. The patients whom a physician sees in the city are, as a rule, either bedridden or well enough to attend to their business. The physician at a mineral spring, however, has to do with a third class of patients—viz., with such as are not bedridden but nevertheless do not need to attend to professional duties and can and will therefore devote the whole work of the day to the treatment of the maladies. It is at once apparent from this that results may be attained on general hygienic principles—entirely apart from any therapeutic power of the various waters themselves—results, however, which are fundamentally a part of the particular province of balneotherapy in the broader sense.

There are, generally speaking, few affections, especially chronic ones, which will not be benefited by a rational dietetic and climatic general treatment of longer or shorter duration. But of particular value, at any rate for certain diseases, must be the profound influence upon certain phases of the metabolic process, such as the digestion and urinary functions, which may be brought about by so powerful a medication as, e.g., the Carlsbad mineral water.

In giving the following report out of my 18 years' experience in treating urinary cases in Carlsbad I do so primarily because the matter is of paramount professional interest to

⁶ Wiener Medicinische Wochenschrift, 1903, No. 17.

⁷ Orvosi Hetilap, July 19th, 1903.

Berliner Klinische Wochenschrift, 1902, No. 13.

⁹ Therapeutisches Monatsheft, August, 1903.

¹⁰ Ibid., April, 1903.

¹¹ Brit. Med. Jour., May 27th, 1905.

¹² Deutsche Medicinische Wochenschrift, 1907, No. 4.

¹³ Münchener Medicinische Wochenschrift, 1905, No. 22.

me and because I believe that in this chapter of therapeutics there remain many questions yet to be answered, many errors yet to be set right. The first of these questions is fundamental: whether, in reality, for patients with a diseased urinary apparatus there is a need for a balneological course of treatment or not? The answer is found in the practice of every day: such patients are, as a matter of fact, sent to the baths, therefore, there must be a felt need of that kind of treatment. The question only remains, whether we may expect such treatment to benefit our patients and, if so, to what degree? I do not wish to be misunderstood; the mere fact the patients visit the baths is in itself certainly no proof of the necessity of bath treatment; the triteness of the phrase "fashionable watering-place" is sufficient testimony to that. But when genuine invalids, such as patients with urinary diseases really are, are sent to a watering-place the conscientious physician must not only feel the need but also be convinced of the expediency of this treatment. If asked what are the indications in such cases for balneological treatment we may give a fairly general answer. Those patients should as a rule be sent whose progress at home is not as satisfactory as might be desired, whether the aim be a complete recovery through influence on the metabolism in general or by local treatment of the urinary organs in particular, or whether in the case of incurable processes one expects an ameliorating effect both on general condition and on particular disease symptoms through the specific healing properties of the mineral-water in question and the general benefit of the *régime*—or whether finally the processes to be combated are in reality those of a generally disordered metabolism and only happen to make themselves evident through the urinary system, as in the case of renal calculus, diabetes mellitus, diabetes insipidus, &c.

It is hardly necessary here to go into the specific properties of the Carlsbad thermal waters; others have discussed them for centuries before us. The properties of Carlsbad waters are beyond controversy which justify their use more especially in diseases of the urinary apparatus. These mineral waters have a favourable influence on the functions of all mucous membranes, especially of those of the bladder and bowel, and they stimulate intestinal and renal activity to a marked degree. We will bear these points in mind, they furnish a starting-point for our inquiries.

It is far from my present purpose to go into the pathology of urinary diseases, I wish only to speak of a certain few factors which have impressed their importance upon me in my practice. As is well known, the diseases of the urinary apparatus may be broadly divided into two groups, the one where local and the other where general symptoms play the chief rôle. The majority of the local affections have an infective origin, while a toxic character prevails in the other group. As I am to confine myself to purely clinical observations I may be allowed to make use of this purely clinical classification.

Of first importance is the question: How do the diseases of the kidney fare at Carlsbad, what is our experience with them there? We will speak, to begin with, of acute and subacute diffuse nephritis. Of late years we have been seeing them more frequently at Carlsbad, and, I must add, have been glad to see them. I at least have had a favourable experience with them. Without further remarks I will give the following case as an example.

An English lawyer, aged 42 years, consulted me in the summer of 1902. Within the year he had been having hæmorrhage from the kidneys, which had lasted with remissions until he came to Carlsbad. Rather in consideration of pain in the left kidney region, of the fact that his father had once undergone an operation for stone, of the sedentary life of the patient, and of the scanty uric acid excretion said to be present, than of any typical course of the disease, a probable diagnosis of nephrolithiasis had been made. To be sure, the possibility had been left open by his conscientious adviser of a hæmorrhage "from another cause." I have mentioned here the nationality of the patient with a reason. It is well-known that England was the starting-point of the movement which defends most emphatically a diagnostico-therapeutic incision of the renal capsule. At the annual meeting of the British Medical Association at Cheltenham surgeons expressed themselves in favour of such an incision in just such cases as the one here cited. If a stone is found it is removed; if not, the after-effects of the operation, due, as is said, to a

"relief of kidney tension," are beneficial, and the pain and the hæmorrhage are said always to disappear. This effect would be comparable to that of an operation for glaucoma. However, the more recent views as to the harmlessness and the favourable after-effects of the operation are by no means so unmixed, and Barth's word of warning with regard to diagnostic nephrotomy at the Berlin Chirurgical Congress in 1900 seems to have found response both in England and on the continent. The two well-known surgeons whom this patient had consulted had spoken of operation as a last resort but were quite agreed in sending him to Carlsbad to begin with. When I saw him first he had a continual dull pain in the left kidney region. The left kidney was tender to pressure. There had been no attacks of colicky pain. In the urine was a layer of blood sediment of a finger's breadth but no clot. The treatment ordered consisted of drinking the waters and heat applications (mud packs) to the kidney region. In a few days the sediment (i.e., the hæmorrhage) had become so scanty that one could recognise, besides the erythrocytes, characteristic blood casts and kidney epithelium. The quantity of albumin was greater than that to be explained by the blood present. Further, in the course of treatment the pain and hæmorrhage disappeared completely. There was never any trace of uric acid and never any trace of pus in the urine. Other points which were in favour of the diagnosis of nephritis need not be here enumerated (as a matter of fact the case was probably one of the post-scarlatinal form), but I wish merely to throw some light on those aspects of the case which were of weight as regards treatment. How are we to explain the cessation of the pain and the hæmorrhage? It is generally accepted that the pain in diffuse nephritis is due to an over-stretching of the capsule from enlargement of the kidney. The diuretic action of Carlsbad water has been so freely discussed by Sandberg, Ewald, Jaworsky, London, &c., that I may properly assume that it is generally familiar. Now Leube recommends the administration of large quantities of alkaline carbonated waters in the early stage of nephritis; and when we remember that Aufrecht regards an occlusion of the tubules of Henle as the cause of the anuria, the mode of action of a diuretic mineral water becomes obvious. As Fürbringer first suggested for infective nephritis the micro-organisms themselves do not seem to be the cause of the kidney injury; this injury seems rather to be attributable to a product of the metabolism of the pathogenic bacteria, to a poison which is excreted through the kidneys. It may be assumed that a diuretic mineral water favours the excretion of the toxins, dilutes them, and so diminishes their harmful action, explaining in this way the favourable results which follow the use of such waters.

The increased diuresis certainly favoured the cessation of the renal hæmorrhage in this case, as in many similar ones that I have seen. The first necessity for hæmostasis is always the elimination, the "flushing-out" of coagula—a process without which the contractile elements in the pelvis or the calices cannot act properly. For example, in checking a hæmorrhage from the bladder the bladder must first be washed clean from clots, these being removed by whatever expedient is necessary, even to aspiration with an evacuator. It is plain that the diuresis works in a similar way upon the kidney.

We learned in school that in case of hæmorrhage, whether of the kidney or elsewhere, the bleeding organ is to be kept at rest and the vaso-constrictors are to be stimulated by cold applications. It will be remembered that I had ordered hot applications, thus departing seriously from traditions. Moreover, the patient in question had by no means kept his bed; he had taken no violent exercise to be sure, but he had taken walks and thus failed to "keep the kidney quiet." Nevertheless, the hitherto refractory hæmorrhage ceased in this as in very many similar cases immediately the treatment was begun. It is not to be assumed that this was a mere coincidence but that the warm compresses first soothed pain, then dilated the urinary passages, opening an unimpeded outlet for the increased diuresis, and that in this manner, as explained above, the elimination of the coagula took place.

I can also record similar results in prostatic cases. Of course, the mechanism is here rather different. We know that the bleeding in prostatic hypertrophy usually comes on at the height of one of the recurrent attacks of congestion

¹ I wish to emphasise that the causal connexion between the commencement of treatment and the cessation of the hæmorrhage was striking. In spite of the usual measures the hæmorrhage had continued unabated for weeks before the Carlsbad treatment was begun

and is usually accompanied by disturbances of circulation in the deeper pelvic organs. Moreover, the increased bowel activity and the flushing out of the urinary apparatus act here as a depletive. Reference cannot too often be made to the very intimate reciprocal relations between intestine and urinary tract; it is a result of their contiguity, of their common blood- and lymph-supply, and in part common nerve-supply and musculature. We will neglect the controversial question as to the penetration of the bladder wall by the colon bacillus; be it only said that we never see so strikingly the defervescent action of a laxative in an acute attack of fever as after operations on the urinary passages or in affections of this apparatus.

Turning again to nephritis, or rather to the different affections grouped under the name Bright's disease, we have to admit that we are as little able to cure them completely by balneotherapy as we are by any other measures. I hope no one will expect such results of us. On the other hand, the balneotherapeutic treatment is particularly well fitted to combat certain *symptoms* with success. In those cases where the quantity of urine is low we see a rapid rise. We shall return to this point again. As to the behaviour of the albumin and formed elements in the urine I am not able to make a detailed report before completing certain experiments now in hand, which I shall reserve for a future communication. I may say, however, that my experiences on the point have been encouraging.

We should lay particular weight on the behaviour of that group of symptoms which Bouchard has called symptoms of *chronic uræmia*. These are the remoter or general symptoms which we have mentioned earlier as the result of toxic influences. Such are gastric and intestinal disturbances, anorexia, profuse diarrhoea or chronic constipation, hemiparesis, hiccup, as well as certain forms of paroxysmal frequency of micturition, or "pollakiuria," a term introduced in medicine by Dieulafoy, phenomena which from their whole nature are to be regarded as toxic. These are favourably affected by every stimulation of renal or intestinal secretory activity. This fact will be especially emphasised if we remember that Biedl and Kraus were able to demonstrate the elimination of various bacteria through the kidney, such as the bacillus coli, staphylococcus, &c., and that they could facilitate this elimination by stimulating the flow of urine. (This is also naturally of importance with regard to certain infective varieties of nephritis. Indeed, we observed in such acute cases rapidly successful results with no other medication than large quantities of mineral water to induce diuresis.) These patients improve notably at Carlsbad, recover appetite and regularity of the bowels, gain in weight, and lose the distressing headaches; their complexion improves—that characteristic toxic complexion—and good humour returns. The physician forgets too often that patients who cannot be cured need and will demand treatment. They are the ones who are most thankful for relief from distressing symptoms, and so much the more thankful if, like most nephritics, they are unaware of the seriousness of their condition and regard the remoter symptoms as the most important or as the whole disease itself.

And so I have more or less defined the goal which balneological treatment has in view for nephritis. My experience has been that compensated heart lesion, even oedema if of a slight degree, are not contra-indications for Carlsbad treatment provided that it is carried out carefully and in the right way. On the other hand, patients with ascites—and, strangely enough, they keep coming to Carlsbad as a last resort—are quite miserable there, as might be expected, and their medical men have to get them home again for their pains. I remember two such cases where I was compelled to tap the abdomen soon after arrival.

Nephritis with serious circulatory derangements (hypertrophy and dilatation of the ventricles) with considerable oedema had better not be sent to Carlsbad, not even *solatii causa*, because the heart-pump is too sorely taxed by the increased amount of fluid taken, as well as by the walks, especially the climbing, which patients at a resort will indulge in, in spite of the doctor's advice. I should like to add another consideration. Nephritics catch cold easily, therefore they should be sent to a place which is subject to so sudden temperature changes as Carlsbad only at the most favourable season of the year. I have had some rather unpleasant experiences in this connexion.

As to renal tumours, there is nothing to be said except that we occasionally see them in Carlsbad after hæmorrhages,

when they have been taken for stone in the kidney. They are, of course, sent at once to the surgeon as soon as the diagnosis is made.

Without wishing to go further into the question of pyelonephritis, pyonephrosis, and other such forms of infection, we must speak of *pyelitis*. This is sometimes due to calculus formation, the *pyelitis calculosa*, or may be of the ascending variety, the *cysto-pyelitis*. The treatment of the first depends on that of the *nephrolithiasis*. The treatment of the second must not only consist in flushing out the infected urinary apparatus by the "drinking cure" and helping in the elimination of the toxins, but must be directed as well against the various local conditions in bladder, ureters, and prostate. Every case of *pyelitis* is sooner or later sent to Carlsbad and one may say, without being too sanguine, that a beneficial effect of the water cure is evident not only in those forms of *pyelitis* where the removal of the causal factor is possible (*pyelitis calculosa*, certain forms of *cysto-pyelitis*) but even in the incurable forms as well. Whether the infection is purely of colon type, or whether it is mixed with proteus, staphylococcus or streptococcus, the increased diuresis and the elimination of the toxins through intestine and kidney seem to play a definite part in bringing about recovery. For many years alkaline waters have been used "to dissolve the concretion and to mitigate the inflammation." We shall presently discuss whether it is possible or not to dissolve the concretion, but the healing effect of the alkalies upon the inflamed pelvic mucous membrane is, at any rate, most apparent in Carlsbad.

We come now to the discussion of *nephrolithiasis*. Among the laity the opinion still prevails that Carlsbad water is able actually to dissolve kidney- or bladder-stones. Strange to say, this opinion has also crept into professional literature without meeting criticism. It is recorded in a Carlsbad publication by Dr. Springsfeld of the year 1756, "*Commentatio de prerogativa Thermarum Carolinensium in dissolvendo calculo vesicæ prae aqua calicis vivæ*," that a kidney-stone of almost two and a half ounces (i.e., about 87 grammes) in weight was dissolved in six days "entirely to a pap, like fine, soft chalk," in sprudelwater.² Springsfeld's other data are all as inexact as that mentioned and give no indication as to the chemical constitution of the stone thus softened. However, we once took the trouble to make a similar test with a urate stone of about the size of a hazel-nut, obtained through the kindness of the late Professor von Dittel. It was a calculus removed, with several others, by a *sectio alta*. We put it into a vessel and for 24 hours let Carlsbad water flow in and out, the whole being maintained at body temperature on a water-bath. The concretion remained unchanged, a loss of weight of only a few milligrammes being appreciable, such as was to be explained by the mechanical breaking and floating off of superficial particles. This experiment proves that uratic stones are not even dissolved *in vitro*; any attempt at a solution of them by the injection of Carlsbad water into the bladder, as has been proposed by some, must therefore *a priori* be condemned as hopeless.

That a solution of calculi in the bladder cannot be brought about by *drinking* the water need only be pointed out to the laity, among whom this superstition still prevails. On the other hand, experience teaches us that concretions both of the kidney or its pelvis and of the bladder may be driven out by the drinking-cure here. The increased diuresis resulting from the latter is beyond question and to this chiefly is to be ascribed the discharge of the stones.

The question, when can Carlsbad treatment promise a success and when ought surgery to assert its rights will be considered in the sequel.

(To be continued.)

² Cited by Hlavacek, Carlsbad, twelfth edition.

WEST LONDON POST-GRADUATE COLLEGE.—The inaugural lecture of the summer session will be delivered by Major Leonard Rogers, I.M.S., on Monday, May 13th, at 5 P.M. The title of the lecture is "The Clinical Diagnosis of Fevers in the Tropics," illustrated by lantern slides. Anyone interested who would like to attend will have a card of admission sent on application to Mr. L. A. Bidwell at the West London Hospital.