(and, if so, how far) or by resting. The temperature is recorded immediately the patient comes in, and he then rests in a long chair until 1 o'clock. As is now well known, even healthy men show a considerable rise of temperature after exercise, and the rise is followed, on resting, by a speedy fall. The same phenomena occur, as a rule, in a case of phthisis, and an exercise temperature of 100° F. recorded at noon will usually fall to 99° or 98.8° F. at the end of rest hour.* The times chosen were therefore 9 a.m., noon, and 1 p.m., and to complete the list, an observation was also usually made at 6 p.m. the evening before.

A series of these observations is shown in the accompanying chart, and it will be seen that in all "walking" cases, except one, the 1 p.m. observation shows a much higher index than the observation made at 9 a.m., and in cases that are resting there is practically no variation throughout the day. The explanation of this, no doubt, is that the exercise leads to a slight degree of auto-inoculation, which is followed by a very transient rise of opsonic index. The one exception, No. 3, was a patient with a nearly-healed lung and a small, healing ulcer in the larynx. He showed less tendency to rise after walking, probably because his lesion was so small that auto-inoculation could only take place to a very slight extent. This series at once explained the difference between Dr. Wright's results and ours.

From this series, which has been quite free from any conflicting results, we conclude that it is a matter of great importance in estimating the effect of injections of tuberculin, or of any particular form of treatment, that the observations should be made at a time when the opsonic index is at its ordinary level, and undisturbed by recent exercise. It is therefore our practice to take all samples of blood at 9 a.m., though, if the patient is resting, the time is obviously unimportant. We have had no opportunity of observing whether exercise in a case of "surgical" tubercle is followed by a rise of opsonic index, but we should expect that, where the focus was small and the chance of auto-inoculation slight, there would be only a slight rise or none, as in the laryngeal case referred to above. We have never found that a patient's temperature gave any clue to the level of his opsonic index.

In view of the fact that so much of the present-day sanatorium treatment is admittedly empirical, and much of it difficult to explain on any scientific grounds, it was hoped that useful knowledge might be gained from an observation of the opsonic indices of sanatorium patients. We think that the series of observations shown here is at least an abundant justification of the routine usually followed, and explains why patients so often make rapid progress as soon as they are well enough to walk without harm. But, in a case where active disease is still present, the decision whether walking is likely to be beneficial or otherwise is one of the most difficult that the sanatorium medical officer is called upon to make, and for which the widest experience is necessary.

As Dr. Urwick has pointed out, a case of active phthisis, shows an alternating high or low opsonic index which he believes to indicate alternating positive and negative phases following auto-inoculation.† If this is the case—and all our observations lead us to endorse his view—it is clearly important that a patient should rest during his negative phase, and probable that he will benefit by walking when his opsonic index is high, since, as shown by Wright and Douglas,² the opsonic pressure is always reduced at the focus of infection even when the opsonic pressure of the blood serum is high. We hold therefore that, taken into consideration with the clinical condition of a patient, a knowledge of his opsonic index will materially help in choosing the routine that will give him the greatest benefit.

We are inclined to think, but our observations are at present too few and the time that has elapsed too short for us to speak with any confidence, that the opsonic index and its range of variation, is a valuable factor in making a prognosis. Wherever there is active disease, either in an early case that has not been long under treatment, or in a case that has not responded to treatment, the opsonic index shows a wide range of variation, but when the disease becomes less active, the opsonic index settles down to a level which shows scarcely

* It is interesting to remember that it is only recently that this rise of temperature after exercise has been generally recognized, while a "normal" temperature on waking in the morning is now regarded as dangerously high, and in most sanatoriums is taken to indicate the need for complete rest during the day.

† Dr. Wright has shown that the rise in bactericidal power which follows inoculation with a bacterial vaccine is preceded by a negative phase of lowered bactericidal power of varying duration.

any variation from day to day (in blood drawn at 9 a.m.), and this level varies widely in different cases. In one case, after initial variations ranging from 0.5 to 2.4, the opsonic index after six weeks settled down to an almost constant 1.0, the observations made every three days being as follows: 0.975, 1.1, 1.0, and 1.07. Another case settled to a mean level of 0.8. Our experience tends towards the view that the case that settles to an opsonic index much below 1.0 is the case that becomes "chronic," that recovers to a certain extent, but that can only maintain that degree of recovery while living under sanatorium conditions. We believe, on the other hand, that a case which shows a steady opsonic index of 1.0 or over is the case which makes a complete recovery if favourable conditions are maintained for a sufficient time.

It is in cases of the first group, with an opsonic index that settles to a level of 0.8, or even lower, that we have had the most encouraging results with injections of tuberculin, and even in cases of the second group we believe it is possible to shorten the time necessary for recovery by artificially raising the opsonic index by the same means.

We are led to publish these observations because we think that, few as they are, they are sufficient to show that a knowledge of the opsonic index of a patient can be of great interest and help to those responsible for his care, since it to some extent explains the rationale of much that has hitherto been empirical in the routine of sanatorium treatment. The process of estimating the opsonic index is slow and tedious, and this prevents any rapid advance in knowledge. It is essential that large numbers of observations should be made, and the curves of variation under varying treatment carefully plotted out. It is only when the work is much more widely taken up than it is at present that any rapid progress will be made. Perhaps these few very incomplete observations may prove sufficient to induce others to take up the work.

CASE I.

Very chronic—extensive disease of lungs. Physical condition fair.

CASE II.

Very chronic lung disease—has responded in a very satisfactory manner to sanatorium treatment.

CASE III.

Nearly healed lung. Small ulcer on left vocal cord. Physical condition good. Opsonic index originally 0.73—now rising after injection of 1/600 mg. of tuberculin on September 17th.

CASE IV.

Chronic lung disease. Physical condition fair.

CASE V.

Chronic lung disease. Physical condition good; C. and D. record negative phase following injection of 1/1,000 mg. tuberculin on September 30th, opsonic index previously 1.0.

CASE VI.

Opsonic index rising after injection of 1/1,000 mg. tuberculin on August 31st; opsonic index before injection 0.68.

CASE VII.

Double psoas abscess, healing sinuses. Injection, 1/750 mg. tuberculin on September 22nd.

REFERENCES.

¹ *Proc. Roy. Soc.*, vols. lxxii. and lxxiii. ² *Lancet*, September 14th, 1901.

ON A HITHERTO UNDESCRIBED CHANGE IN THE URINE OF PATIENTS SUFFERING FROM NEPHRITIS.

BY

MARC ARMAND RUFFER and G. CALVOCORESSI.

[From the Port Vieux Laboratory, Alexandria.]

In a preliminary paper (*BRITISH MEDICAL JOURNAL*, 1903, vol. 1, p. 190) Armand Ruffer and M. Crendiropoulos showed that the injection of the urine of man, or of certain animals, into rabbits rendered the serum of rabbits haemolytic for the blood corpuscles of man or of that species of animals the urine of which had been injected. In another paper (*Journal de Physiologie et de Pathologie*, 1905, p. 820) the same authors and G. Calvocoressi showed that the substances (lysogens) producing a haemolytic serum dialysed slowly, were totally insoluble in ether and almost insoluble in alcohol, were precipitated from urine by saturation with ammonium sulphate or lead acetate, showed great resistance to the action of heat, but were quickly destroyed by acids or alkalis. They disappeared

slowly from such urines as were kept for several weeks exposed to air, but they resisted putrefaction for some days.

In an extensive series of experiments the same authors showed that a small fraction of the total quantity of urine passed by a healthy adult in twenty-four hours, when injected into a rabbit weighing approximately 1 kg., sufficed to produce a powerful haemolytic serum, dissolving human red blood corpuscles rapidly, and acting even when greatly diluted. Further experiments showed that any estimation of the quantity of lysogen in any given sample of urine could only be very remotely approximate.

The object of the investigation now to be described was to ascertain whether pathological urines contained more or less lysogen than normal urines; and for this purpose we examined the urines of patients suffering from various diseases, according to the method to be described presently. In this paper, however, we shall treat only of our investigations concerning the urines of patients suffering from albuminuria due to chronic or acute nephritis.

In order to estimate the lysogen of any given sample of urine, the total quantity passed in twenty-four hours was collected, and a given proportion of it injected into an animal weighing 1 kg. approximately. Suppose, for instance, it was decided to inject one-sixtieth of the total quantity of urine passed in twenty-four hours, then 30 c.cm. were injected if the man passed 1,800 c.cm., and 50 c.cm. if he passed 3,000 c.cm. in the twenty-four hours. The quantity of urine so injected was always such that we knew that a corresponding amount of healthy urine would surely produce a haemolytic serum. Nevertheless, in all cases, we injected another rabbit with a corresponding amount of healthy human urine.

The animals were killed one week after the injection, and the serum tested by our usual method (see papers quoted above) on human red blood corpuscles.

All but two of the patients whose urine was injected were typical cases of chronic nephritis. They all had albumen in the urine, and for the most part casts also. In most of them there was considerable anaemia, together with oedema of the extremities, puffiness of the face, and occasionally ascites. Dyspnoea, high tension pulse, and irregularity of the heart were often present. Impairment of vision, anorexia and digestive troubles were also common symptoms. The two exceptions were cases of acute diphtherial nephritis.

Table Summarizing Results Obtained:

(A) Number of patients whose urine was injected	...	...	16
<i>Results:</i>			
The urine of 1 patient produced a strong haemolytic serum			
" 4 patients produced weak haemolytic serums			
" 11 did not produce haemolytic serum.			
(B) Number of control experiments...	...	...	16
<i>Results:</i>			

In every case the urine produced a strong haemolytic serum.

A weak haemolytic serum is one which in a 83 per cent. solution does not haemolyze a given quantity of red blood corpuscles, but produces slight haemolysis in more than one hour. A strong haemolytic serum is one which, added in the same proportions, dissolves blood corpuscles completely in less than one hour. As a matter of fact, however, when added in such proportions, all the strong (control) haemolytic serums but four dissolved the blood in less than five minutes; and even when diluted they acted very rapidly, generally in less than five minutes.

The only conclusion we draw at present is that the physiological action of the urine of cases of chronic and diphtherial nephritis is, in the large majority of cases, very different from the action of the same quantity of urine of healthy human beings.

On November 21st the Société Médico-Chirurgicale de Paris, which is but a few months younger than its analogue and homonym of London, celebrated the hundredth anniversary of its birth. Professor Debove, Dean of the Faculty of Medicine, presided at the ceremony, being assisted by Dr. Huchard, Honorary President, and Dr. Desnos, President of the Society. Addresses were delivered by Drs. Desnos, Huchard, and Roche. In the evening the members of the Society dined together, the Minister of Public Instruction, M. Bienvenu Martin, being in the chair.

We regret to learn that Professor Albert Ladenburg of Breslau, to whom the Royal Society recently awarded the Davy Prize for his researches in the domain of organic chemistry, has had to undergo amputation of the right leg. Nevertheless, Professor Ladenburg hopes to be able to continue to discharge the duties of his Chair.

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

A CASE OF CEREBRO-SPINAL MENINGITIS.

THE following case in a spinster, draper's assistant, an unmarried woman, aged 36, recently occurred in my practice. The day preceding her illness, the patient, being then in excellent health, went on a seaside trip, partaking in the evening, in common with several others, of some tinned salmon. The following day (August 18th) she complained of severe headache, had abdominal pain, vomiting, and diarrhoea. It continued throughout the night; she had no rigor or vertigo. At 7 a.m. on August 19th she was seen by my assistant; her condition then was as follows:

She was lying on her side in a semi-comatose condition, being only roused with difficulty, her face flushed, tongue furred, pulse 90 and somewhat bounding in character, temperature normal; abdomen moved naturally and did not appear tender; cardiac and pulmonary sounds normal; pupils equal and normal, no squint, no muscular twitchings; menstruation was in progress.

Calomel $\frac{1}{2}$ gr. was given every three hours until 2 gr. had been taken. Later in the day I visited her myself. The vomiting and diarrhoea had stopped. She took some notice but was too deaf to answer any questions. She was given a mixture containing bismuth, potassium bromide, tinct. card. co., bicarbonate of soda, and aromatic spirits of ammonia. She apparently continued improving till the evening of August 20th, when she became actively delirious and a chloral draught was given and the foregoing mixture repeated, but she did not sleep and became even more excited. On August 21st her head was found to be retracted, her back slightly concave, her legs drawn up, and the facial muscles twitching. Herpes had appeared round her mouth; pulse 100, full and bounding; temperature 100.5° F. She was still wildly delirious. Ice was applied to the head and spine; she was ordered a paraldehyde draught which was without effect; two hours later a half-grain morphine suppository being given, she slept for six hours. Her condition was then as follows:—

Head much retracted, opisthotonos well marked, pupils contracted and equal, legs drawn up, Kernig's sign present, together with marked contraction of the hamstring muscles. Knee-jerks unaltered; no ankle clonus; Babinski's sign absent. Numerous petechial spots, dark in colour, and one or two lines in diameter over the upper part of her back. Temperature (at 11 p.m.), 102° F.; pulse, 100, full; Cheyne-Stokes respiration; still acutely delirious.

She was given another morphine suppository, after which she again slept for some hours. From this time, however, she gradually sank into a comatose condition, and died at mid-day on the 22nd, the retraction of the head and spine becoming very marked towards the end. Owing to the extreme delirium of the patient, lumbar puncture unfortunately could not be performed.

The history and symptoms of this case are very instructive, and afford an almost typical picture of what in Osler's classification is termed the "ordinary" form of cerebro-spinal fever, as opposed to the "fulminant" and "anomalous" varieties. The severe vomiting and purging at the outset, following the hearty meal of tinned salmon, might possibly have led one at first sight to diagnose ptomaine poisoning, but after-events proved the true nature of the case. Hardly a symptom was wanting.

I have notes of a similar case in a girl, aged 13, whom I saw fourteen years ago, and which terminated fatally in an equally short time.

Chard.

NAPIER CLOSE, L.R.C.P.Ed., etc.

A NEW METHOD OF GIVING IRON.

I HAVE lately been trying a new way of giving iron, which seems to offer some advantages over the pill method. It was warmly recommended by Dr. Meissner at a meeting of the Berlin Medical Society in January, and as I have obtained capital results in a few cases, I thought others might like to know of it.

The constituents of Bland's pill (Pil. Ferri, B.P.) are enclosed in an airtight gelatine capsule with cod-liver oil. The idea is that the oil protects the gastric mucous membrane from irritation, as well as being useful when absorbed; that the carbonate of iron is produced in its nascent state in the stomach; and that the resulting sulphate of soda tends to counteract the constipating effect of the iron.