theritic bacilli, as many as five or six micro-organisms being sometimes enclosed within one cell. Some of these intracellular bacilli appear to be perfectly healthy, staining and retaining aniline colouring matters well, whilst other micro-organisms, also contained in amoeboid cells, show signs of degeneration varying from a mere difference in the power of retaining gentian violet, to complete disorganisation and destruction. The description of these changes I must reserve for another occasion.

Many amoeboid cells in the membrane, more especially those present in its most superficial part, show distinct necrotic changes, many of them losing the power of retaining colouring matter. The nucleus breaks up, does not stain at all even with strong log wood or carmine, the surrounding protoplasm swelling up, becoming more yellow, and not unfrequently vacuolated. In later stages they show distinct signs of breaking up. Many of the degenerated cells contain bacilli in their interior, whereas others are quite empty.

The bacilli lying between the cells in the fibrin and coagulated exudation fluid are for the most part quite normal to all appearances. Occasionally, though very rarely, one is met with presenting signs of degeneration similar to those found in the bacilli contained in amoeboid cells. I do not think it justifiable to argue from this that the inflammatory liquids present in the membrane possess a microbe-killing power, but, judging from the number of dead leucocytes present in the membrane, it is far more probable that, in all probability, these partially-digested microbes were originally contained in a leucocyte which had died and undergone liquefaction.

I conclude from these observations that:—

1. The bacilli of diphtheria are present in the most superficial part of the membrane only, that is, in a place where they are well within reach of medicinal agents—an observation not without interest from the point of view of treatment.

2. In the diphtheritic membrane there is an active struggle taking place between the amoeboid cells in the membrane and the micro-organisms. In other words, the diphtheritic membrane is a battle-field for amoeboid cells and the pathogenic microbes of diphtheria.

3. The reason why the bacilli do not actually penetrate into the tissues is probably that as soon as they try to do so, they are arrested by the amoeboid cells present in the diphtheritic membrane.

ALLEGED DEATH FROM THE APPLICATION OF AN ARSENICAL PLASTER.

By SIR CHARLES A. CAMERON, M.D.,

Professor of Chemistry, Royal College of Surgeons, Ireland; Medical Officer of Health, Dublin.

C. F., a woman of the peasant class, aged 53, residing in the County of Wexford, was affected with cancer of the right breast. Dr. Shee, who examined her, recommended an operation for the removal of the cancer, but the patient declined to submit to it. On March 31st, 1890, she drove on a car a distance of 30 miles to be treated by a Mrs. J. W., who enjoys a great reputation as a cancer curer. Mrs. W. placed a plaster upon the affected part, and Mrs. F. returned home. It appears that the double journey of 60 miles occupied nearly 18 hours, and the patient reached home in a highly fatigued condition. On her way home she complained of sickness in the stomach, and she vomited once or twice. She remained ill, and had severe retching, and much diarrhoea (the discharge was greenish) until her death, which occurred on April 8th, at midnight. Dr. Shee, who, with the assistance of Dr. De Benzy, made the *post-mortem*, found that the part of the breast in contact with the plaster was ulcerated superficially. Dr. Shee had noticed that previous to the application of the plaster the skin was unbroken.

The stomach, portions of the liver, kidneys, and small intestines, and the right breast of the deceased, and also the plaster which had been placed on her breast, were delivered to me for analysis. The plaster was found to contain a large amount of arsenious acid. No arsenic was detected in the viscera, but the tissues of the breast contained it in decided quantity.

As a result of the inquest held on the remains of Mrs. F., Mrs. W. was committed for trial, the coroner's jury having found the following remarkable verdict. "We find that the said C. F. died at Saltmills, Parish of Tintern, of poisoning by arsenious acid, commonly called white arsenic, on the 8th day of April, 1890; and that said poison was absorbed from a plaster placed upon the

right breast of said C. F., deceased, at Kinteady, on the 31st March, by Mrs. J. W., whom the said C. F. did feloniously kill and slay against the peace of our Lady the Queen, her crown and dignity. We desire to add that to our certain knowledge Mrs. J. W. has conferred much benefit by her plaster on many persons resident in and near the locality."

Mrs. W. was tried and acquitted at the Wexford Assizes on July 17th. It was stated that the deceased had been for a long time delicate, and that she had on two occasions been ill in her stomach. Her counsel suggested that the gastro-enteritis, which the symptoms of the case and the *post-mortem* examination had demonstrated, might have been the result of the fatigue and cold caused by her long journey. For the prosecution, the medical evidence upheld the theory that the deceased's death was the result of arsenical poisoning.

In 1883, the viscera of a man, residing in the County of Cavan, who had died with symptoms of irritant poisoning, were submitted to me for analysis by the authorities. A plaster had been applied by a quack to a tumour from which the deceased suffered. After the death of the deceased the quack was arrested and placed in prison. Arsenic was detected in the liver and kidneys of the deceased, and a portion of the plaster which had adhered to the tumour was found to contain arsenic. In this case there was no doubt of the absorption of the poison from the plaster. Shortly before the time fixed for the trial, the accused died in prison.

Quite recently, in the county of Kilkenny, an embrocation was applied to the back of a cow, which shortly afterwards died with symptoms of poisoning. The embrocation was found to be a concentrated solution of arsenic, and arsenic was detected in the stomach of the animal, and in a portion of the flesh to which the solution had been applied.

PARAGUAY TEA.

By T. CRANSTOUN CHARLES, M.D.

PARAGUAY tea, called also *maté* or *Yerba maté*, from the name of the cup in which it is infused, consists of the dried leaves of the Brazilian holly, *Ilex Paraguensis*. This plant is most extensively used by the whole population of South America. It is said to possess many of the good qualities of tea, but a long indulgence in its use has been stated to induce diseases similar to those following the abuse of alcoholic drinks. I have also been told that dyspepsia is a frequent result, which I can easily understand, seeing that the common practice is to take it immediately before meals; in fact, it is taken at every possible opportunity.

Lately I was presented with some specimens of this tea by my friend, Mr. Chapman, who had been a resident in South America for several years. By his kindness I was also provided with the *maté*, or cup, in which the infusion is made, as also the *bombilla*, or tube, through which it is sucked. The tea is first placed in the gourd, in which it is well shaken; a little warm water is then added, and the leaves stirred up; the gourd is next filled up with boiling water, and in a few minutes the liquid will be ready for drinking. It is to be stirred up from time to time, and more hot water added as necessary, on account of the slowness with which exhaustion occurs, care being taken to prevent the loss of the aroma by never letting the infusion cool down.

As to the pain or discomfort of the stomach said to be produced by its use in the case of beginners I cannot say that I have yet noticed more than a slight discomfort in one or two individuals. By Mr. Christy's kindness I have also received other specimens of the *maté* tea, and I beg here to thank him for the information he was good enough to send me. I have lately made several chemical examinations of this body, as I found that the analyses published of it varied very greatly. The alkaloid present is caffeine, identical with the caffeine found in tea and coffee; there is also a tannic acid present in large amount. I have determined the percentage of both these bodies, as also the percentage of ash in tea, coffee, and *maté* after the same methods. Although in some respects *maté* is closely allied to coffee, yet it yields up its active principles in a different way. It was not until after I had discovered this for myself that I found the same had been previously shown to be the case by Conty and Mournet at the Vulpian laboratory. Percolation by alcohol, for example, furnishes the largest quantity of soluble substances; and it is also much slower than coffee in yielding up its nutritious principles to boiling water.

Caffein.—This is the name now given to the alkaloid of tea as well as coffee—chemically it is a d-methylxanthin. I have employed three methods in this determination, but one chiefly which I shall detail in a few words. Possibly the method with magnesia and alcoholic extract gives more accurate results, for a little of the caffein undoubtedly does not crystallise out in the lead method; but the latter I found the most convenient for my purpose; besides, the same method was followed with all three bodies, so the results will be accurately comparative.

Extraction of Caffein.—Ten grains each of dried tea, coffee and *maté* are finely powdered and then thoroughly extracted with boiling water. To the filtrate subacetate of lead is added to complete precipitation and the precipitate removed by filtration. A current of H_2S is now passed through the filtrate to remove any lead present; the next filtrate therefrom is evaporated down considerably, and then left aside for twenty-four hours, when the caffein crystallises out and is to be recrystallised.

Tannic Acid Determination.—A rough estimation was first made by extracting 10 grains each of the three bodies with boiling water, and weighing the precipitate obtained on the addition of a solution of gelatine and alum, the precipitate obtained being dried, weighed, and 40 per cent. of this weight taken as tannin. Then Löwenthal's permanganate of potash method, as modified by Estcourt, was followed. Only in the case of tea, however, did I obtain satisfactory results. Therefore with the coffee and *maté* the tannic acid was separated and weighed, an alcoholic extract being evaporated, the watery residue precipitated with subacetate of lead, the precipitate collected, washed, and decomposed with hydric sulphide, and the last filtrate evaporated to dryness, which yields the tannic acid in a yellowish-tinted, friable mass. The ash was also determined. The analyses, therefore, stand thus:—

	Caffein. Per Cent.		Tannic Acid. Per Cent.		Ash. Per Cent.
Tea ...	3.1	...	22.7	...	5.8
Coffee (roasted) ...	1.2	...	5.8	...	4.6
<i>Maté</i> ...	0.79	...	21.9	...	4.1

The tannic acid of tea is known to differ from gallo- or quercitannic acid, yet it generally goes by the same name; it certainly differs from the tannic acid present in coffee and *maté*. According to Rochleder, the tannic acid present in *maté* is identical with the cafeeo-tannic or chlorogenic acid of coffee; Arata, however, maintains the contrary. With an infusion of coffee, the addition of a few drops of ammonia under the influence of the air develops a beautiful green colour, supposed to be due to the change of caffeic into viridic acid. This reaction I find is somewhat different in the case of *maté*.

The caffein exists partly in the free state and partly combined with tannic acid and potash. The amount of the caffein I found very variable in the different specimens of *maté* I analysed; one gave me as much as 1.05 per cent., while another only indicated 0.2 per cent. Mr. Christy has had an analysis made indicating 1.19 per cent.

Although the active principles of these bodies appears to be the same, yet it must be said that the bodies themselves act somewhat differently on the system; and it is to be remembered that their action is not dependent alone on their proportion of alkaloid, but also on the presence of other bodies in small amount, such as volatile aromatic oils, empyreumatic products, and the like.

I made a series of experiments upon myself and a friend with the alkaloid I separated from the *maté*, and these are some of the results obtained with doses of 1 to 3 grains:—

1. The respiration, as shown by a stethograph, was first hastened, but later rendered slower: normal average of respirations, 17 to 18; fifteen minutes after taking the alkaloid, respirations 22 to 26; forty minutes after, 18 to 20. An exhilarating effect was likewise produced.

2. Slightly increased vascular tension as indicated by the sphygmograph showed itself soon, but a variable time, after the ingestion of the drug; it lasted a considerable time, varying, however, according to the dose, and when the blood pressure sank apparently to normal or below it, it was followed later by another slight rise.

3. With small doses ($\frac{1}{2}$ grain) the contractions of the heart, as indicated by a Marey's tambour at the apex, and a continuous sphygmographic tracing, became slower and stronger. But with a dose of 4 grains the action became more frequent and irregular.

4. The urine passed for the two hours after taking 3-grain doses of the alkaloid, as compared with that passed in the two hours previously, showed a very slight increase in the urea and phos-

phoric acid eliminated, but a further more marked increase occurred sometime later. The same conditions, as far as possible, were observed as on the two preceding days when the same experiments were made at the same time without any alkaloid. Both the quantity of the urine and the total solids were slightly increased. I say here for two hours, as the desire to micturate was too considerable to allow of the urine being retained in the bladder for any length of time.

5. A strong solution applied to living excised muscle of the ordinary grass frog (*Rana temporaria*) produced a state of rigidity very closely resembling that induced by heat, no increased irritability showing itself however.

When strong solutions of the *maté* tea were taken it was noticed that:—

1. The respiration seemed to be slightly accelerated but continued easy and tranquil. An estimate of the carbonic acid gas expired was made by comparing the increase in weight of a caustic potash apparatus after an hour's expiration through it—the nose being clipped—with the increase occurring under the same conditions as far as possible as to food, time, and surrounding temperature, but, after the ingestion of the *maté*, there was an undoubted diminution noted in the carbonic acid gas expired.

2. The blood pressure was at first slightly raised, with slowing of the pulse, it then fell slightly, and the pulsation increased from 75 to 83 per minute.

3. The heart's action was rendered slower for some time and then accelerated, but was readily slowed again by the passage of an electric current along the line of the vagus in the neck.

4. The urine was apparently increased in quantity and was passed with greater frequency. The urea was determined every hour for four hours. Its elimination as well as that of the phosphoric acid was diminished, but ultimately slightly increased, the increase, however, being less marked with the phosphoric acid.

Both *maté* and its alkaloid, as separated by me, were given for some time to three young men who undertook long walks and very long cycling rides at my wish and under my direction. The experiments made upon them and also on myself under similar conditions were of a most varied kind, but the general results appeared to be that the tissue waste was to a large extent retarded; that with little or no previous preparation long journeys and most arduous tasks could be undertaken without any apparent after-evil consequences; that the restorative effects in states of mental and physical exhaustion were well marked; and that these sustaining and recuperative properties were retained. Further, that the chief results obtained were constant and rarely variable, and that the digestion itself was stimulated, new life and sustaining power being imparted to the system.

But even from my comparatively limited experience *maté* and its alkaloid seem to act somewhat differently in different individuals, in some the muscular, in others the nervous, and in others again the digestive system, being chiefly affected.

Maté accordingly appears to act as a cerebral stimulant, and also to have a special action on the sympathetic system, the contractions of the cardiac muscle being increased as well as those of the unstriated muscle of the bladder and intestine; and the whole muscular system seems to be stimulated by it to increased labour and wakefulness. Indeed, my friend Mr. Chapman assures me that when he was exhausted by a long day's journey on horseback under a burning sun in South America, he used to experience immediate comfort and relief from a cup of *maté*. This also appears to be the general experience of those who drink it, for the natives of South America maintain that its use allays their fatigue, and prepares them for fresh efforts; and that after it their vigour remains longer unexhausted.

As to the therapeutics of this body, so far, at least, as my experience with patients is concerned, I am sorry to have so little to relate. To two old ladies who were great tea drinkers, and used to suffer much from sleeplessness, headache, and constipation—whose condition, moreover, had been gradually changing for the worse for the previous months—I prescribed the use of *maté* tea. After taking it for a week they assured me they "never felt better;" that their bowels had become regular—for this tea, it is known, excites the peristaltic action of the intestines; that they slept well, made more urine, and suffered no more from headaches. They certainly looked better, but I must confess the beneficial change appeared to me partly the result of their imagination. How permanent it may be time alone can tell. (The good effects, however, still continue, and the *maté* has now been taken for upwards of a year.) It has proved serviceable also with some

seven other patients, varying in age from 18 to 45, who suffered from severe nervous headaches, generally associated with constipation, and with whom tea and coffee appeared to disagree.

MEMORANDA:

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

REMOVAL OF CALCULUS FROM URETHRA.

On July 19th I was called to attend Mr. M., a farmer, aged 47. I found him in bed, complaining of nausea, flatulence, want of appetite, and pain at the point of the penis, with frequent calls to micturate, but inability to make water. Beside his bed stood a jar half full of blood-stained urine, and a gum elastic catheter which had been given him by his former medical attendant.

The history of the case was this: In July, 1889, he was seized one day, while doing heavy work, with pain in the lumbar region, sickness, and vomiting. This attack lasted for about two hours. After it had subsided he had a call to make water, but found he was unable.

On making careful inquiry into the onset of his trouble I found the patient could not definitely say that he had ever felt more pain over one side than the other, though he clearly remembered having intense pain in the right testicle while the colic lasted.

After preliminary examination of the rectum and prostate, I proceeded to make an examination of the bladder, when, in trying to pass a metal catheter along the urethra, I came upon a hard obstructing mass, situated in front of the triangular ligament. After a great deal of manipulation I succeeded in getting the mass to move forwards along the urethral channel to within half an inch of the meatus urinarius externus. Here I was able to secure it by means of a pair of forceps, and, after some difficulty, succeeded in extracting it. On removal, I found it to consist of a smooth bean-shaped calculus, greyish-brown in colour, and of remarkable density. It weighed 13 grains, and measured, in its longest and broadest diameters, 1.5 and 1.2 centimetre respectively.

It would appear that the calculus had descended from the right kidney when the patient was attacked with colic in July, 1889, and then, or shortly afterwards, in attempting to escape *per vias naturales*, got caught in the urethra, where, in all probability from the history of the case, it must have been for a year.

Caithness, N.B.

D. GAIR BRAIDWOOD, M.B., C.M. Ed.

A CASE OF EMPYEMA.

C. S., aged 29, of healthy parentage, came under my hands in August, 1889, suffering from cough, expectoration, shortness of breath, and wasting, and he was considered by his friends to be in a "decline." He had been laid up in bed for ten weeks some eighteen months previously, but "did not know" from what he had then suffered any more than that it had come on with a "cold," and from this he had never thoroughly recovered, and had had much difficulty in carrying on his employment. He had now complete dullness and enlargement of the left side of his chest, and the hypodermic syringe proved the existence of fluid of a semi-purulent nature. Four pints were removed on August 24th with the aspirator, and the man improved rapidly, but in about three weeks his symptoms again became troublesome, and I again aspirated, and this time removed two pints of a fluid of a more purulent nature than before. From this time (September 19th, 1889) his symptoms improved rapidly, there was no return of the fluid, and he was out of doors in about a week. I put him on cod-liver oil, and in three weeks from beginning to take it his weight had increased from 9 stone 3 pounds to 10 stone 3 pounds, and he now scales 11 stone. He is now in very good health, and can carry on his laborious work with ease.

The case appears worth recording, from fluid of so purulent a nature clearing up so rapidly after simple aspiration, and from the little damage to the lung after such long-continued and considerable pressure. It is interesting also in showing the endurance of the man, for he had carried on his laborious occupation up to within a week of the time I first tapped him.

Falbourn.

F. L. NICHOLLS.

FOREIGN BODY IN SOFT PALATE.

I WAS called to see a man, aged 58, who complained of a severe sore throat, which, he said, had gradually been coming on for some days, and now it interfered with swallowing.

On examination, I found that the left posterior half of the hard palate, the soft palate, left tonsil, and uvula were acutely inflamed and swollen, the uvula being quite cedematous. I ordered hot water and chlorate of potash gargles, and next day the cedema had nearly all subsided, especially in the throat, and he was able to swallow very well; but the soft palate was still swollen, and pus oozed out from a small sinus which could now be seen. On passing a probe into the sinus, what was thought to be a piece of loose dead bone was felt. I then passed in a probe-pointed bistoury and slit up the sinus, and with a pair of dressing forceps laid hold of the supposed necrosed bone. To our surprise a piece of clay pipe shank, nearly one inch and a quarter in length, was removed. Three nights before sending for me the man remembered falling forward while stooping. He was smoking at the time, and the stem of the pipe ran against the roof of his mouth, but he had no idea that a piece had penetrated, the pain being so slight. No symptoms developed for two days, when he began to feel neuralgic pains, which he attributed to a bad tooth. After this his throat trouble developed. He says he was not drunk at the time, having only had one glass of beer at supper.

Liverpool.

THOMAS STEVENSON, M.B., C.M. Ed.

REPORTS

MEDICAL & SURGICAL PRACTICE IN THE HOSPITALS AND ASYLUMS OF GREAT BRITAIN, IRELAND, AND THE COLONIES.

STANLEY HOSPITAL, LIVERPOOL.

A CASE OF PARALYSIS OF THE CIRCUMFLEX NERVE.

(By T. R. BRADSHAW, M.D., M.R.C.P., Physician to the Hospital. J. B., aged 46, a dock labourer, came on March 20th, 1890, complaining of loss of power in the right shoulder. He was temperate and generally enjoyed excellent health. His previous history suggested the possibility of his having had a secondary eruption thirty years ago; but no symptoms suggesting syphilis had appeared since then. The only other illnesses were typhus twenty-five years ago, and an erysipelatous inflammation of the right arm, following a wound, five years ago. He was married and had seven healthy children, one had died, and another was said to be delicate.

His present attack came on three weeks before he came to the hospital. He had been engaged unloading a ship on the river and was more than usually exposed to cold and wet. On leaving work he felt chilly and went to bed. After sleeping some time he awoke with an intense pain in the right shoulder, shooting down the arm. The pain was very severe for two days, when it left him in the state he was in when he came to the hospital. He appeared to be a robust well nourished man, in perfect health except for the condition about to be described. When he tried to abduct his arm the deltoid did not act, but the scapula was strongly rotated and the acromion raised by the associated action of the muscles that should fix the scapula when the arm is raised by the deltoid. The annexed figure taken from a photograph shows this rotation of the scapula very well. It was taken with the arm abducted to the utmost degree possible. There was slight but appreciable atrophy of the deltoid, and the reaction of degeneration was obtained to a slight degree; the fibres were also unduly irritable to percussion. There was no sign of paralysis of any other muscle; paralysis of the teres minor, which was probably present, does not cause any manifest symptom. Cutaneous sensibility was markedly impaired over the muscle in an area corresponding to the distribution of the circumflex nerve. There was no pain, and no spontaneous sensations were complained of.

When the patient was last seen, about two months after the above date, some movements had returned in the deltoid, but there was still slight numbness in the affected area of the skin. He continued to be in good general health, and was employed as a porter.

REMARKS.—The limitation of the paralysis, motor and sensory,