greatly distended and the peritoneal coat injected and covered with lymph. The abscess was carefully packed off from the rest of the abdominal cavity and opened. It contained very offensive pus, and the distal end of the diverticulum, which was rotated twice, gangrenous and attached by its distal end to the umbilicus. The pus was carefully wiped away and the diverticulum traced to its origin about 12 in. above the ileo-caecal valve. It was then resected and its attachment to the small intestine closed by two layers of sutures. One tube was placed in Douglas's pouch through a suprapubic incision and another through a small incision immediately below the umbilicus leading into the abscess cavity. After the operation, saline was given per rectum, but the first half-pint was immediately returned with a large quantity of faeces. For six days after operation there was slight pyrexia due to mild suppuration around the abdominal incision. Subsequent progress uneventful. The patient was discharged for England on January 14th with a small granulating area.

CASE II.—*Bullet Wound of Thigh, involving Femoral Artery ; Gangrene: Amputation.*

F. C., aged 23, three days before admission, whilst walking, was wounded at a range of 250 yards. He lost a large quantity of blood, and was taken to the field hospital, where he was dressed, and the bullet, which was lying under the skin on the opposite side of the thigh, extracted. The leg was dressed twice under an anaesthetic before he reached this hospital. On admission the patient was blanched and had evidently lost a great deal of blood. The right thigh was much swollen, and there was a bullet wound in the line of the femoral artery. No pulsation could be detected in anterior or posterior tibial arteries.

Operation.—An incision was made over the swelling in the line of the femoral artery; a large traumatic aneurysm was found. The incision was prolonged upwards and the superficial femoral artery tied in the upper third of Hunter's canal. The clot was then evacuated and a ligature applied to both sides of the wound in the artery. It was noticed that the femoral sheath was oedematous and had a greenish tinge. For the next three days the patient was very ill, and complained of pain in the calf. The foot remained warm and of good colour. On the third day the calf was swollen and very painful. An anaesthetic was given and a vertical incision made in the middle of the calf. The superficial structures, including the gastrocnemius muscle, appeared normal, but on incising the deeper muscles they were found to be green and gangrenous. A circular amputation was performed at the junction of the upper and middle thirds of the thigh. No attempt was made to fashion flaps. It was found, however, that the gangrene had spread along the outer side of the thigh, which necessitated the removal of more skin, fat, and superficial muscles. The condition of the patient at the time of operation was so grave that the question of amputation at the hip-joint could not be considered.

Eight days later, as the patient remained seriously ill with much pyrexia, the rest of the femur was disarticulated at the hip, and, as we anticipated, we found that the medulla of the bone was filled with pus.

Subsequently he began to improve, but a week after the last operation a large abscess, containing a pint of pus, was incised in the left gluteal region. The stump was treated by exposure to the air, irrigation with saline, and spraying of the wound with hydrogen peroxide every few hours. The patient was discharged for England on January 10th with a healthy granulating stump.

CASE III.—*Bullet Wound of Skull: Laceration of Occipital Lobes: Loss of Sight: Operation: Recovery.*

W. T., aged 42, two days before admission, while advancing to attack, was wounded by a bullet fired at 150 yards' range. He lost consciousness, but could not tell how long for; when he became conscious again he found that he had completely lost his sight, and could not distinguish between light and darkness.

Condition upon Admission.—Mentally dull, and history obtained with difficulty. Pulse 60; temperature 98.6°. He complained of severe frontal headache. No paralysis. Knee-jerks and plantar reflexes normal. Pupils medium size and equal. He could now distinguish between light and darkness, otherwise there was complete blindness. He was deaf, more so on the left side than on the right, but gave a history of some deafness previous to injury. On examination of the skull a small wound of entrance could be seen 1 in. to the left of the external protuberance and 1 in. above it. An admirable x-ray photograph, taken by Dr. W. A. Probert, showed the fractures in the skull with the depressed fragments lying in and on the brain.

Operation.—After shaving the scalp, a small wound of exit was seen two inches to the right and above the external occipital protuberance. A large horseshoe flap was turned down, including the two wounds. The two openings in the skull were clearly exposed, and brain matter escaped from the wound of entrance. Both openings were enlarged, to the size of half a crown on the right and a two-shilling piece on the left, and the intervening bridge of bone removed. The dura mater had been torn from one opening to the other, and brain matter bulged out freely. The opening in the dura was enlarged, and an irregular piece of bone—roughly half an inch in diameter—was removed from the posterior end of the left occipital lobe, and a similar somewhat smaller piece from the right. Throughout the operation a continuous stream of hot saline was directed on

to the exposed area. The lacerated tissues around the wounds of entrance and exit were swabbed with pure carbolic. The flap was then sutured, but free drainage was secured by strips of rubber, one being inserted at each angle, two small ones through the bullet wounds, and a fifth through the most dependent part of the base of the flap. On recovering consciousness an hour after operation, the patient volunteered the statement that he could distinguish between nurses and orderlies. There was also apparently considerable improvement in his hearing. Subsequently steady improvement was maintained. For the first three days there was a slight rise of temperature ranging up to 99.5° or 100°, and on two occasions the pulse dropped to 56. There was also for three days some bulging through the opening in the skull. A certain amount of discharge escaped along the rubber drains for the first four days. The wound healed up soundly by first intention. Headache and giddiness persisted after operation, but daily became gradually less, and ceased at the end of a week. Colonel W. T. Lister kindly saw the patient on several occasions, and reported that there was no optic neuritis. The field of vision steadily improved, and at the time of his discharge, twenty-three days after operation, there was only a small central scotoma, and the patient was able to read large handwriting.

TREATMENT OF
CEREBRO-SPINAL MENINGITIS BY ANTI-
MENINGOCOCCUS SERUM COMBINED
WITH AUTOGENOUS VACCINE.

BY

J. RUPERT COLLINS, M.A., M.D.DUB., M.R.C.P.LOND.,
HONORARY PHYSICIAN, CHELTENHAM GENERAL HOSPITAL.

THE case of cerebro-spinal meningitis here described may be of interest, as from Sir William Osler's article in the *BRITISH MEDICAL JOURNAL* for January 30th it appears that there are other foci of the disease among the troops.

A boy, B. S., aged 9 years, was quite well up to January 11th, 1915. On the morning of January 12th he complained of pain in the head and vomited twice. Dr. Dighton, when he saw him the same day, found him semi-conscious, restless, and with a temperature of 105°. On the next day Dr. Dighton asked me to see the patient with him, and we saw him together each day until the boy's death.

On January 13th the boy was unconscious, delirious, lying with thighs and knees flexed, restless, but resenting being moved. Some purpuric spots were present irregularly distributed over the trunk and limbs. The abdomen was retracted, no enlarged glands could be felt, and no abnormality was detected in the heart or lungs. The pupils were equal and reacted to light, there was no strabismus and no retraction of the head. Kernig's sign was very marked, the plantar reflex was irregular, and the knee-jerks were present. It was evident that we were dealing with some form of meningitis and it remained to determine its nature.

At Dr. Dighton's suggestion, I had brought apparatus for lumbar puncture, and drew off 15 c.cm. of cerebro-spinal fluid, which came away under considerable pressure. The fluid was very turbid and on standing left a deposit of nearly half an inch of pus in the bottom of the test tube. A few Gram-negative diplococci were found after long search through the pus cells. Cultures made from the fluid yielded a good growth of Weichselbaum's diplococcus. Subcultures were made on a dozen tubes, from which a vaccine was prepared. The patient became quite conscious after the lumbar puncture and passed a good night.

On January 14th I removed 20 c.cm. of cerebro-spinal fluid and injected intrathecally 16 c.cm. of antimeningococcus serum (Burroughs, Wellcome and Co.). After this the patient became very restless and remained very restless all night. The next day the patient was unconscious and the pulse was so extremely feeble that we did not think it safe to perform rachicentesis. His head was now markedly retracted, and the left eye showed conjunctivitis and some opacity in the anterior chamber. Autogenous vaccine, containing half a million of the *Diplococcus meningitidis* was injected subcutaneously.

On January 16th he seemed distinctly better—much to our surprise, as we had not expected to find him alive. He had passed a good night, and taken nourishment well. The pulse was stronger, and he was conscious. We decided to give a second injection of the antimeningococcus serum. Dr. Dighton gave him a little chloroform,

as he had done on the previous occasions, and I drew off cerebro-spinal fluid. As the fluid came away the pulse gradually became weaker; when 12 c.cm. had come away the pulse was imperceptible at the wrist; we then stopped, and injected 8 c.cm. of the antitoxin. As this was done the pulse again appeared at the wrist. The remainder of the phial of serum was injected subcutaneously. He did not sleep at all that night, and on the morning of January 17th the nurse gave him an injection of pituitary extract, as his condition became very bad. We found him later quite unconscious, with scarcely perceptible pulse, 150 to the minute, and the head still more retracted. The anterior chamber of the left eye now contained thick, curdy-looking pus. He was again injected with half a million of his autogenous vaccine. The evening of the same day he was again seen by Dr. Dighton, who found him extraordinarily improved; he was able to take food by the mouth, was rational, and looked as if he was now really going to recover. At 4 o'clock the next morning, January 18th, he took a sudden turn for the worse, became cyanosed, the pulse failed, and he died the same morning.

The only comment I have to make on the case is that we were disappointed with the antimeningococcic serum, which, as far as we could judge, produced no clinical improvement. On the two occasions on which the vaccine was given a notable improvement followed. The sterilization of the vaccine was effected by heating to 58° C. for thirty minutes.

PRELIMINARY NOTE ON TWO CASES TREATED BY RIB TRANSPLANTATION.

BY

W. I. DE C. WHEELER, M.D., F.R.C.S.IRE.,
SURGEON, MERCER'S HOSPITAL, DUBLIN.

Two recent cases of transplantation of bone have impressed on me the usefulness of portion of a rib as a transplant instead of the anterior crest of the tibia, which is more usually employed.

Congenital Dislocation of the Hip.

In this case the child, aged 4, was treated unsuccessfully by Lorenz's method. The following operation was performed on March 5th, 1914, through Kocher's posterior incision. The upper and posterior rim of the acetabulum was freely exposed, and the bone in this region freshened by light touches of a gouge and chisel. A finger-length of one of the upper ribs was removed in a position where the curve seemed suitable for re-enforcing and deepening the posterior portion of the acetabulum. Before reduction of the dislocation three single sutures of fine aluminium bronze wire were passed through the bone in the required position with a strong fully curved needle. The head of the bone was then levered into place and the rib fixed with its centre at the point where the head of the bone appeared to escape most easily from the socket.

Skiagrams taken at frequent intervals showed, first, the rib in good position; afterwards it almost disappeared, and later still a well-defined shadow marked the position of the transplant.

The head of the bone, judging by the skiagrams, did not appear in the best position, and the joint was again exposed through Murphy's "goblet" incision eight months after the first operation. The head was found, after rotation of the leg inwards, to be in normal relation to the acetabulum, and the latter showed an excellent formation of new bone deepening the socket considerably at the site of introduction of the rib. The shape and size of the new bone corresponded in a large measure to the original transplant.

Modification of the Albee Operation for Spinal Caries.

In this case the child, aged 5 years, was operated upon on January 19th for ever-increasing kyphosis in the mid-dorsal region of the spine. She had been treated without success since May, 1914. Absolute rest with extension on a Whitman's splint and subsequently with a spinal jacket did not arrest the progress of the disease. Skiagrams showed active caries in three vertebrae.

An incision was made slightly to one side of the spines of the vertebrae and carried well above and below the

disease. The laminae and transverse processes were cleared of the soft tissues and the exposed bone freshened with Jones's arthrodesis gouge. The articulations of the adjacent ribs were freely exposed. A superficial horizontal incision approximately at right angles to the vertical incision was carried forwards in the direction of the ribs. The erector spinae muscle and dense aponeurosis was carefully preserved and pulled backwards. The rib was divided with bone forceps just outside the articulation and was easily separated forwards under the muscle to the required length and removed. The curve of the rib suited admirably the kyphotic curve of the spine. The rib was laid on the freshened bone and held firmly in position by interrupted sutures of catgut through the divided soft parts. The fragments of bone detached during the freshening of the vertebrae were carefully preserved and placed deeply in the wound.

The application of the graft alongside of the spinous processes after Jones's method, instead of the original plan of splitting the spinous processes to receive it, and the procuring of the transplant from the operation area with very little addition to the original incision, made the operation simple and rapid.

The size and shape of the graft, as in the first-mentioned case, was admirable.

In both cases, in trying to save the periosteum of the rib, the pleura was injured, but at the time of operation it was obvious that this was avoidable; and in neither case did the patient suffer any ill effects from the development of transient pneumothorax.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

SUGGESTED FORM OF TREATMENT FOR TETANUS.*

THE bacillus of tetanus produces toxins which affect the nervous system. No doubt the toxin becomes incorporated with the nerve centres—it passes to the nerve centres, not by way of the lymphatics of the nerve, but through the plasma of the nerve fibres. I can well imagine why the treatment of tetanus with antitoxic serum so frequently fails to cure. Flexner states that *Trypanosoma gambiense* can be suppressed by drugs in the blood and lymph vessels without being destroyed in the central nervous organs, and the virus of poliomyelitis prevented from developing through intraspinal injections of an immune serum that is without effect when introduced into the blood. I may add that when I was working on pellagra in Columbia, S.C., I gave monkeys subdural injections of a bacillus which I found in the nodes of patients who suffered from pellagra; in twelve hours I made a lumbar puncture and inoculated ascitic real broth tubes with the cerebro-spinal fluid which was withdrawn. In twenty-four hours I had a vigorous growth of the same bacillus.

The treatment by antitetanus serum is a general treatment, but what we require is a local treatment to come into contact with the local infection of the nervous centres of the brain and cord. We certainly have not had brilliant results in treating syphilis of the nervous system by injecting salvarsan into a vein—in other words, by general treatment—and it is dangerous to inject salvarsan directly into a subarachnoid space. Swift and Elliott† were the first to employ the serum of salvarsan-treated patients for intraspinal injection, and many brilliant results have been met with by this generalized local form of treatment. As Flexner remarks, it is known, for example, that the cerebro-spinal liquid produces a means of direct and immediate contact with the structural tissues of the brain; whatever chemical is introduced into this liquid will immediately find its way to the supporting elements—the nerve cells and fibres of the cortex.

Why not treat tetanus by the same method as syphilitic diseases of the nerve centres? The cases are parallel. We recognize the fact that the toxin or toxins of the tetanus bacillus are incorporated with the nerve centres and fibres. We know that general treatment with anti-

* Abridged.

† New York Medical Journal, 1912, 10, 10653.