LATERAL SINUS THROMBOSIS OF OTITIC ORIGIN

With Report of Four Cases

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A review of current medical literature will show that the subject of lateral sinus thrombosis has been presented from almost every angle and from practically every part of the world but practically nothing has been written about the subject in China. This paper is presented, therefore, in order to emphasize the fact that lateral sinus thrombosis does exist in the Orient, and at the same time to give our experience with a limited number of cases.

Lateral sinus thrombosis is one of the most common and dreaded intracranial complications following or accompanying the suppuration of the middle ear and the mastoid. The percentage of its occurrence varies greatly according to the opinion of different authors. Most specialists agree that lateral sinus thrombosis occurs in from 3 to 6 per cent of operated cases. Naftzger reports six cases in 192, (3.12 per cent), and quotes Hill as having seven cases in 166, (4.21 per cent); Downey, five cases in 79, (6.32 per cent); Gerber, 25 cases in 524, (4.77 per cent), Massachusetts Charitable Eye and Ear Infirmary, 19 cases in 479 (3.82 per cent) and Mayo Clinic 19 cases in over 500, (3.8 per cent). The statistics as quoted above give an average total of 4.34 per cent. However, White states in the fifty first annual report of the Manhattan Eye, Ear and Throat Hospital that in a series of 566 cases of acute and 22 of chronic mastoiditis, there were only 11 cases of sinus thrombosis, an incidence of 1.8 per cent. In a series of 387 operated cases of mastoiditis in the Peiping Union Medical College Hospital
only four cases were proved by operation to have a thrombus, an incidence of 1.03 per cent. In a number of other cases the jugular was tied, and the sinus opened, following typical symptoms of sinus thrombosis; and while recovery was rapid in such cases, no demonstrable clot was found on opening the lateral sinus. Some of the cases may have had mural thrombi. A clot filling the entire lateral sinus was found in all of the cases reported below.


L. E. N., female, age 24 years, was admitted to the hospital on December 29, 1928, with purulent discharge from the right ear and tenderness over the right mastoid. The history of present illness showed that the patient had had discharge from the right ear for two months associated with earache and impairment of hearing. She had dizziness and headache and tenderness over the right mastoid.

The family history was negative and the previous medical history gave chronic otorrhea of the right ear about two years ago.

The physical examination, on admission, showed a well-developed and well-nourished girl, complaining of discharge and pain in the right ear, and tenderness over the right mastoid on pressure. The eyes, nose, and throat were essentially negative, except that the tonsils were slightly enlarged. The right external auditory canal was filled with purulent discharge. The tympanic membrane was swollen and bulging, with a perforation inferiorly. Definite swelling and tenderness were noted over the right mastoid. The lungs and heart were negative. The neck was not stiff, but there was slight tenderness on the right side below the ear. The extremities were negative and the reflexes normal. On admission her temperature was 37.4°C., pulse 80, and respiration 16. The Roentgen ray films showed extensive involvement with bone destruction of the right mastoid, but there was no frank evidence of abscess cavity. A diagnosis of acute or subacute mastoiditis was given.

Emergency simple mastoidectomy on the right side was performed immediately after admission under ether anesthesia,
because of the clinical findings. The cortex was sclerotic, while there was a quantity of granulations and pus in the mastoid cavity, a culture from which showed growth of hemolytic and non-hemolytic streptococcus. No exposure was made of either dura or sinus. The wound was drained with iodoform gauze strips and kept partially open. The leucocytosis was 20,720.

Following the operation the temperature became slightly elevated. Her general condition was good with the exception of a little pain in the operative wound. On December 31, the headache became more intense, especially on the right side above the wound, and the temperature went up to 40.6°C. (See temperature chart).

On January 1, her temperature remained high and she was irritable, but showed no rigidity of the neck or Kernig's sign. The complete dressing of the right mastoid was done, and all the metal slips were removed, leaving the wound widely open. The condition of the chest and abdomen could not account for the fever. The fundi were normal. The headache did not increase on pressure of the jugular veins. The fluid obtained from the spinal puncture was negative and gave no growth on culture.

Three days later, the ear canal was dry and the mastoid wound did not show many granulations. The temperature dropped to subnormal but rose up again after a severe chill lasting for half an hour. The fundi were hyperaemic. The lumbar puncture was repeated and now showed definite evidence of block in the venous system on the right side, although the fluid was normal. The patient had some tenderness in the neck along the jugular vein on the right side.

On January 5, the exploratory operation for epidural abscess was performed and the dura of the middle cranial fossa was normal. A few cells filled with granulations were discovered in the mastoid tip and an abscess was found below the mastoid in the soft tissue. The deep cervical abscess might be the cause of pain in the neck. The lateral sinus was inspected but not opened. After the second operation she seemed a little better. Her headache almost disappeared. The middle ear was dry and the mastoid wound had no pus. The abscess cavity below the mastoid tip showed very little purulent discharge.
However, the temperature was high the day following operation and continued to be irregular with frequent chills.

On January 8, the blood taken for culture on January 2, showed growth of hemolytic streptococci and 20 cc. of 1 per cent mercurochrome solution was given intravenously without immediate untoward result, except subsequent abdominal pain in the umbilical region. The temperature dropped down to normal the next morning, but did not remain down. Blood culture taken on January 7 was positive for hemolytic streptococci.

On January 11, the temperature was up to 39.2°C. The headache on the right side was severer than before, the neck slightly stiff. The mental condition had not changed since admission and was still clear. Fundi were still hyperaemic. The spinal fluid was normal by laboratory examination. In Tobey's test on compression of the left jugular there was a prompt rise and drop of spinal fluid pressure from 185 mm. to 350 mm. of water; and of the right jugular a slow rise which stayed up, on releasing the pressure from the neck. We felt that these findings indicated a partial blocking of the return venous flow through the right internal jugular, suggesting a mural thrombus partly obstructing that sinus. It was decided, therefore, to ligate the jugular vein and explore the lateral sinus. The whole length of the lateral sinus of the mastoid aspect was exposed. The sinus wall was dark blue in color, velvety in appearance and firm to touch. A hypodermic needle was inserted into the sinus, but nothing could be withdrawn except some clotted blood. The internal jugular vein on the right side was ligated with a single ligature of heavy silk under aseptic conditions and the skin wound closed. Returning to the mastoid wound, the sinus was incised along its long axis and a big piece of thrombus was dislodged. There was no sign of purulent softening in the clot, although when it was cultured it was positive, for non-hemolytic streptococcus. Profuse dark blood spurted out from both ends of the sinus immediately after the removal of the thrombus. The bony openings of the sinus were packed with iodoform gauze after the cut edges of the sinus were turned in.

The temperature still remained high after the operation. The patient looked exhausted and complained of chilliness and headache, so a blood transfusion of 400 cc. whole blood was
given on January 13. Blood taken on January 15 for culture showed no growth. The iodoform packings in the sinus were taken out on the fifth day of operation. The temperature dropped down to normal on January 16 and patient became free from signs of intracranial irritation and able to sit up on January 21. She had an uneventful convalescence and was discharged, completely recovered, on February 1, 1928.


T. T. L., male, age ten years, was admitted on December 19, 1929, for further observation following operation of the right mastoid at the Central Hospital.

The present history was that the patient had had otorrhea on the right side since childhood. This ear trouble had improved intermittently. The hearing had been very much impaired. About 7 or 8 days ago the patient had an acute exacerbation of the ear condition on the right side. Two days later there was swelling and tenderness behind the right ear, at which time he was seen in the Central Hospital. The record stated that a huge fluctuating mass was located behind the right auricle which pushed it outward and forward. The ear drum was entirely gone with granulations in the middle ear; the temperature was high. Emergency mastoidectomy was done in that hospital and about 50 cc. of foul pus was obtained from the fluctuating mass. The mastoid cortex was perforated and the fistula located above the antrum. In the mastoid cavity, there was a large piece of loose bone, deeply situated and near the dura plate of which no attempt at removal was made, because of the danger of injuring the facial nerve. The wound was kept open and irrigated with Dakin's solution every day after operation. On the day before the admission to this hospital, the patient had had a sharp rise in temperature up to 40°C. The patient was advised to come to this hospital for further observation and operation, if necessary.

The family history negative with the previous history of otorrhea on the right side since childhood.

Physical examination at the time of admission showed the patient extremely ill and pale, although not feverish. The ear
canal was still full of discharge with granulations in the middle ear. The mastoid was becoming clear and the necrotic bone inside the mastoid wound freely movable. The temperature was 37.2°C.; pulse 88. Eyes and nose were negative; tonsils moderately enlarged and cryptic, but not inflamed. Cervical and inguinal glands were palpable, heart and lungs negative, except for a slight impairment of percussion note in the left apex. No râles could be heard. The neck was not stiff; and extremities negative with reflexes normal.

The mastoid was operated upon again on the third day after admission, because the temperature had gradually gone up to 38.3°C. when the necrotic bone was dislodged and removed. The mastoid was unusually big with some unhealthy granulation at its bottom. The dura plate was intact, but a large area of lateral sinus was exposed. The patient stood the operation very well. On the day of operation, the temperature was as high as 39.9°C. and dropped by crisis in the evening without any noticeable chill. Blood culture was taken and gave negative findings. The total white cell count done day before the operation was 18,000, polymorphonuclear cells 72 per cent. No parasites were found in the blood smears.

On Dec. 21, the temperature remained subnormal in the morning but the patient had a chill at 2.45 in the afternoon followed by a sharp rise in temperature to 40.6°C. The leucocytosis was 14,600, polymorphonuclear cells 88 per cent. Because of the clinical condition and necrosis about the lateral sinus ligation of the jugular vein was decided upon. The jugular vein was isolated and found to be somewhat collapsed, but ballooned after ligation.

The lateral sinus was then opened and a little dark blood escaped from the incision. Much organized and infected blood clot was dislodged, and free bleeding obtained from both ends of the incised sinus. Both sinus and mastoid were dressed in the usual way. The patient came out from ether anesthesia in good condition. 700 cc. of normal saline solution was given subcutaneously.

During the postoperative period of ten days the temperature curve showed a sharp rise almost every evening, except the 23rd of December. The rise in temperature was not always preceded by a chill; and no marked sweating was noticed after
the crisis. Blood transfusion of 300 cc. and then 310 cc. of whole blood was given on the 24th and again on the 26th day. Saline infusion was performed twice, on the 25th and the 27th of December. Mastoid dressings which were changed once a day, were always soaked with clear fluid, apparently cerebrospinal fluid, from the second day after the opening of the lateral sinus. The tissues were all very necrotic in this case, and it is conceivable that a necrotic area in the dura gave way during the manipulation used in removing the clots. The mentality of the patient was clear, although he looked very tired and ill.

On the 27th of December, the patient had headache and the temperature was still swinging. The white cell count was 27,000. The patient was examined by the neurologic service and the examination showed that the patient was fully conscious, rational and co-operative. The cranial nerves were negative; the pupils and speech normal. Suggestive Kernig sign and slight stiff neck were present. Finger to nose showed no ataxis. The left hand showed adiodokokenesis. Knee jerks and ankle jerks were hyperactive with bilateral Babinski and ankle clonus. Abdominal reflexes were prompt on both sides. There was no sensory disturbance, and the sphincters were under control.

After the consideration of the examination, a diagnosis of suggestive meningitis was made. The lumbar puncture had been postponed on account of the constant leaking of the clear cerebrospinal fluid from the mastoid wound. On 30th of December, lumbar puncture was done and the spinal fluid was clear and colorless. The pressure was 200/175. The cell count of the spinal fluid was 240 per cubic millimeter. As the patient sobbed during the procedure, the test of jugular compression was not satisfactory, although there was a rise on the left side.

On Dec. 28th, the flow of spinal fluid from the wound ceased, but the temperature showed no improvement. However, the patient stated that he felt very comfortable.

On Dec. 31, the mastoid was clean without leakage of the spinal fluid, and the cervical wound healed.

On Jan. 1, the patient complained of dull headache over the left side and became worse on coughing. The temperature remained high without marked remission.
On Jan. 2, the patient still complained of persistent headache over the left side. The temperature stayed above 40°C. Neurologic consultation was requested again and the examination revealed definite signs of meningitis, but no definite localized signs to suggest brain abscess. Ophthalmologic examination showed pseudopapillitis on both sides.

On Jan. 5, the headache was still persistent over the left side. The patient vomited frequently, apparently projectile in nature. The neck was rigid with pain on passive movement. Kernig sign and bilateral Babinski were positive. Bilateral choked discs were present. The patient had definitely generalized meningitis, and was discharged against advice on the next day, condition hopeless.

Case III: **Chronic suppurative otitis media. Acute mastoiditis. Non-hemolytic streptococcus bacteremia. Thrombosis of the lateral sinus.**

K.L.Y., male, age 19, was admitted on Feb. 13, 1930, with the chief complaint of pain and discharge in the left ear of six weeks' duration.

The history of present illness showed that the patient developed a severe earache, followed by discharge, six weeks previous to admission. The earache continued with headache, dizziness and purulent discharge. He had no vomiting nor nausea and did not notice any elevation of temperature. He was seen several times in the clinic about three weeks before entering the hospital, but upon being advised to have an X-ray of the mastoid, discontinued his visits. Patient had a somewhat similar attack last year with the same ear, but he gradually got better.

The family history was negative. Patient admitted venereal exposures, but denied venereal infection.

The physical examination on admission showed a fairly well nourished and developed Chinese soldier, evidently acutely and gravely ill. His mind was clear and he was co-operative. Examination of ears disclosed the right ear normal, the left, canal filled with mucopurulent discharge and the superior-posterior canal sagging. The ear-drum was perforated and pulsating. There was a definite tender swelling behind the left ear but the auricle was not noticeably prominent. The temperature was 38°C. The X-Ray showed that the cells of the right mastoid
were pneumatic. Those in the left mastoid antrum were definitely clouded, and the lateral sinus lay slightly anteriorly. The lungs and heart were negative except for a soft systolic murmur at the apex. The abdomen and extremities were negative; left testicle undescended. The tonsils were moderately enlarged and cryptic with nose and eyes normal. Urinalysis was negative.

· The following day a complete mastoidectomy was performed under ether anesthesia. The cellular part of the left mastoid was diploetic and filled with granulations. The secretion in the mastoid cavity was scanty, from which a culture was taken but gave no growth. The external wall of the antrum was dense and a little mucous discharge was removed from it. The dura plate was intact, the sinus plate necrotic and a large area exposed, but no evidence of sinus phlebitis.

The postoperative convalescence was not unusual until February 16th, the second day after the mastoid operation, when the patient complained of a severe chill followed by a sharp rise of temperature to 40.5°C. The white cell count was 24,400. Fundus examination showed hyperaemic discs and hemorrhage in the right eye. Lumbar puncture was done in the morning and the spinal fluid was negative by laboratory examination. The Tobey test showed evident blocking of the venous system on the left side. Shortly after lumbar puncture, the patient was seen by Dr. Dunlap who discovered somewhat by accident what may prove to be a new aid to diagnosis. Remembering the fact that many patients, who have had lumbar punctures, complain of headache when anything is done to increase intracranial pressure and learning that the Tobey test had been positive in this case, the right internal jugular was compressed. Immediately the patient cried out with pain in the head. Pain continued until the jugular was released. Upon compression of the left internal jugular no pain or disturbance of any sort was caused the patient. Headache could be produced upwards of an hour and a half after lumbar puncture and was demonstrated to interested members of the staff during that time; but several hours later, just before operation, when an attempt was made to demonstrate the test, no response could be obtained by compressing the right jugular.
Under ether anesthesia the left jugular vein was exposed and ligated with a single ligature at the level of the hyoid bone through an incision along the anterior border of the sternocleidomastoid muscle. The vein was somewhat collapsed when it was unsheathed and ballooned up slowly when ligated. The skin wound was closed with metal clips. The mastoid was exposed again and a small number of granulations removed from the cavity. The lateral sinus was exposed and found to be dark blue in color and tough in consistency. On clearing off the sinus a small opening appeared from which thick pus escaped. Incision along the long axis of the sinus was made and foul pus rushed out freely from the lower end of the sinus, more rapidly when the neck was pressed. No trace of blood clot could be demonstrated from the lower end of incised sinus, but considerable was obtained from the horizontal portion, though no free bleeding from either end. The culture of the sinus content showed streptococcus hemolyticus. The sinus was drained with iodoform gauze strips into both ends, and mastoid dressing was applied in the usual manner.

On Feb. 17, the temperature remained normal, while the patient had no headache or dizziness. The character of the discharge changed to bloody seropurulent, but was still profuse. Rubber tube drains were used for the drainage of both ends of the sinus (Fig. 1). The tube inserted into the lower end was long enough to reach the jugular bulb and the upper one, to meet the torcular herophili. This dressing was done twice a day. The discharge in the jugular bulb was sucked with a fine rubber tube attached to a Dakin's syringe (Fig. 2). Following the second operation the temperature was somewhat elevated for five days. During this period the patient had slight headache now and then. The leucocytosis was 12,600. The neurologic examination was essentially negative, and the spinal fluid showed no sign of meningitis. However, the discs were more choked. Blood cultures were taken on three occasions; the first on Feb. 14th gave growth of streptococcus non-hemolyticus; two successive cultures were negative, the second taken three hours before the ligation of the jugular and six hours after the chill.

On Feb. 24, the temperature was normal for two days and the white cell count normal. No discharge could be expressed
FIG. 1.

Rubber tubes draining the jugular bulb and the horizontal portion of the lateral sinus.
Fig. 2.
Rubber tube drain threaded with silk.
Dakin's syringe with rubber tube attachment.
from the jugular bulb. The choked discs were improving. The length of the rubber tubes became gradually shorter and shorter as the healing process in the sinus advanced, and the drains were finally discarded on March 4.

The convalescence, although slow, was gratifying. When the patient was discharged to the Out-patient Department, on March 17th, the mastoid wound was almost healed and the middle ear had only slight moisture. On April 4th the patient showed complete recovery.


H.T.H., Male, age 14 years, was admitted on April 12, 1930, with pain in the right ear, and fever.

The history of the present illness showed that the patient had had pain and discharge in the right ear for about ten years, which first followed an attack of measles. At times, the patient had dizziness and nausea after exercise in school and the discharge continued, with occasional headache and fever. His ear trouble had never been carefully treated. During the past week the earache had increased in severity. He had chills followed by fever, headache, anorexia and acute pain and tenderness over the right mastoid. Fever remained high and headache persisted. Patient was seen by a physician in Tientsin and referred to the hospital.

The family history was negative and the previous medical history showed that the patient had had measles about ten years ago and an occasional cough, but no hemoptysis.

Physical examination on admission showed that the patient was underdeveloped and poorly nourished, but with normal nose and eyes. The patient had the appearance of being ill and distressed. He was pale, anemic and had a drowsy appearance. The examination of the affected ear showed much foul pus in the external auditory canal. The drum was entirely gone with much granulation in the middle ear. There was no definite swelling over the mastoid; tonsils were enlarged and cryptic; several teeth carious; temperature was 38.4°C.; pulse 178, respiration 38. White cell count showed total leucocytes 28,450,
polymorphonuclear 89 per cent. Urine analysis was negative. Neurologic examination was essentially negative, with no paralysis of cranial nerves, no paralysis of limbs, no disturbance of the vision field (finger test), no spontaneous nystagmus. Pupils reacted normally, were round and regular. Reflexes were normal, except a suggestive Babinski. The Kernig test was negative. A diagnosis of serous meningitis of otitic origin was made and lumbar puncture was suggested accordingly.

In view of the clinical characteristics of the lateral sinus thrombosis—chills, high temperature, rapid pulse and acute exacerbation of chronic mastoiditis, operation was decided upon and performed immediately after admission. The mastoid cavity was filled with granulations bathed in pus, culture from which gave a positive growth of steptococcus non-hemolyticus. The antrum was full of cholesteatomatous material. The pus was foul-smelling. A large area of the lateral sinus was exposed by disease and its wall thickened and firm. The operative findings confirmed the provisional diagnosis. After changing gloves, the neck was opened along the anterior border of the sternomastoid muscle. The jugular vein ballooned up slowly above the ligature which was applied at the level of the hyoid bone. Returning to the mastoid the sinus was opened. Profuse pus, dark in color, rushed out from the lateral sinus when incised. Flow of pus was increased by compression of the neck. There was no blood clot from the lower end, but a little from the horizontal sinus. The sinus was packed with iodoform gauze in the usual way.

In spite of the free drainage of the mastoid and the ligation of the jugular vein, the temperature was still high with marked remissions the next day. The first dressing of the mastoid was done. Blood taken for grouping and culture. The latter was reported to be negative five days later. Direct transfusion of 250 cc. of whole blood was done in the evening.

After the operation and transfusion, the patient still had repeated attacks of chills, once or twice a day, for two days. On April 14th, the thickened wall of the lateral sinus was excised and pathologic examination showed chronic inflammation of fibrin tissue with attached partially organized fibrin. On April 15, the packing in the lateral sinus was removed, and much foul pus obtained from the jugular bulb. Rubber tubes were

Case II: Chronic suppurative otitis media, Acute mastoiditis. 
Caries of mastoid bone. Thrombosis of the lateral sinus. Cerebral meningitis.

Case IV: Chronic suppurative otitis media, Acute mastoiditis. 
Abscess of lateral neck region. Thrombosis of the lateral sinus.
Lateral Sinus Thrombosis of Otitic Origin

used for drainage. Dressings were changed three times a day. Lumbar puncture showed good respiratory oscillation, with negative laboratory findings. Leucocytosis was 21,000.

On April 16, the temperature was still swinging. However, the patient had no chills, but much pain in the operated side of the neck. Spinal fluid was again negative and showed no blocking on the normal side. Local examination revealed tender swelling with some subcutaneous emphysema around the cervical wound. The neck was operated upon, beginning from the old surgical wound, by Dr. Zinniger. Incision was extended downward parallel to the anterior border of the sternomastoid muscle and continued down over the upper third of the chest. The subcutaneous tissues were found to be edematous and honeycombed with small pockets filled with pus. There was considerable odor. The infection principally in the subcutaneous tissue, was suspected as due to gas bacillus. Cultures taken during and after the operation, showed no anaerobic organisms, but growth of staphylococcus albus. The wound was packed with compresses soaked with Pilcher's solution.

On April 18th, the temperature came down gradually and the general condition, as well as the local wounds were improving.

On April 24th, the temperature remained near the normal level for about a week. Ophthalmologic examination showed normal fundi. Blood taken on April 16th was reported to be negative again.

On May 1st, temperature was about the same as during the previous two weeks. The patient felt perfectly well, although the jugular vein and the cervical wound were still secreting some discharge.

Coincident with an elevation of temperature, an abscess formation was discovered in the neck and was re-opened under gas-oxygen anesthesia on May 7th.

On May 10th, both ends of the lateral sinus were filled tightly with granulations and entirely healed. The neck wound was healing as well.

The convalescence, although protracted and stormy, was very gratifying. The patient was discharged from the hospital on May 20th, and later on from the out-patient department on June 19th, 1930 with both wounds closed and the ear dry.
COMMENTS

Don M. Campbell\textsuperscript{1} states that statistics show the right lateral sinus to be larger than the left and its relationship to the mastoid cells such that it is rendered more liable to infection than the left in the proportion of 3:2. Rugg\textsuperscript{2} points out however, that the occurrence of lateral sinus thrombosis, as a whole, is equally divided, between the two sides. Three of our four cases, were on the right side and one on the left, making a proportion of 3 (right) to 1 (left).

The four cases reported here were all found to have a thrombus in the lateral sinus. These occurred in 387 operated cases i.e. 1.03 per cent. There were, however, two other cases giving the clinical picture of lateral sinus thrombosis during this period which were treated with ligation of the right jugular vein, but no definite thrombus could be obtained, bleeding from the incised lateral sinus was very free from both ends but after ligation the two cases made rapid recovery. All of the four cases reported here gave a history of acute exacerbation of a chronic infection of the middle ear.

Naftzger\textsuperscript{3} describes the mode of infection as follows; "Sinus infection is usually transmitted from the infected mastoid cells, either by the smaller veins in contact with the infection or by direct contact of the infectious material with the sinus wall." Naftzger quotes the following description of the formation of the thrombus given by Don M. Campbell: "At first there is a phlebitis—an infection of the tissue making the wall of the vein, then comes a breach in the inner lining of the wall, a slowing of the blood current and formation of a coagulum. This coagulum becomes infected, a thrombus is formed and the way opened to a general bacteremia. The coagulum grows until a mural clot is formed, and particles of this may be detached by the blood current and thrown into the general circulation, causing symptoms of bacteremia."

Three (II, III and IV) of the four cases had lateral sinus exposed by the disease. These sinuses, no doubt, were in contact with infectious material in the mastoid. The sinus wall of case IV was also examined histologically and showed chronic inflammation of fibrous tissue with attached partially organized fibrin, which was probably the thrombus.
The invasion of the infection is usually indicated by a chill preceding a sharp rise in temperature. The positive culture of the blood is one of the most important diagnostic factors of lateral sinus thrombosis, but a negative culture may mean nothing. In our series, cases I and III had positive cultures but the blood cultures of cases II and IV were negative. In case III, the blood cultures were taken on three occasions; the first during the course of fever was positive; the second, taken five hours after the chill, gave no growth; and the third, after the ligation, was also negative. The positive blood culture obtained from case I was taken during the rise of temperature and the negative one after the ligation.

The unusual complication of leaking cerebrospinal fluid from the mastoid wound in case II was probably due to rupture of a necrotic inner wall of the sinus upon the removal of the blood clot. It is fair to assume that this was the starting point for the meningitis.

According to a study by Swift5, the constant signs or symptoms of the lateral sinus thrombosis are "Septic temperature. Positive modified Queckenstedt or filling of opposite disc. Veins on jugular pressure plus. Leucocytosis plus. Normal spinal fluid pressure."

In case III, the temperature chart shows a marked sharp rise before the ligation of the left jugular vein. In case I, the operation on the lateral sinus was delayed by the discovery of more infected cells in the mastoid, and the abscess in the neck, even though the temperature was somewhat characteristic of lateral sinus thrombosis. Rise in temperature may occur once in every twenty-four hours as shown in the temperature charts of cases II and III or several rises may occur in a single day as shown in the temperature charts of case I and IV depending upon the rapidity and quantity of the toxins invading the blood stream. Chills before a rise in temperature were almost always present in all four cases, but profuse sweating, after the crisis of the temperature was not remarkable. Though the character of the temperature curve may change, if another complication be present as in case II, the temperature showed less remission, as the suggestive symptoms of meningitis appeared,
The diagnosis of lateral sinus thrombosis was made on cases I and III with the aid of the lumbar puncture. The clinical picture of cases II and IV was so characteristic that the diagnosis was made without examination of the spinal fluid. The spinal fluid of cases I and III was negative by laboratory examination, and the pressure and cell count of the spinal fluid within the normal limit. In diagnosing unilateral sinus thrombosis, the Ayer-Tobey sign of the cerebrospinal fluid pressure was found to be very helpful. In making this test pressure on the jugular of the unaffected side (in the carotid triangle) the existence of an obliterating clot might easily be shown by a sharp rise in the height of the fluid; the release of the pressure on the jugular being followed by an immediate fall to the original manometric reading. Pressure on the affected side shows either no rise or, more commonly, a slow rise. Pressure of the cerebrospinal fluid during the lumbar puncture of cases I and III rose slowly on compression of the jugular of the affected side and stayed high on releasing the pressure. The rise and fall of the pressure were prompt on the compression of the sound side.

The cell count and the pressure were markedly increased in case II, where the lateral sinus thrombosis was complicated with meningitis. Another interesting point of the lumbar puncture which should be mentioned here, is that the headache of case III was exaggerated, by pressing the jugular vein on the sound side. This sign was discovered by Dr. Dunlap shortly after the puncture and he states that the meninges may be more congested and more sensitive after the intracranial pressure is suddenly released by withdrawal of the fluid. The sensitive meninges may cause headache when intracranial pressure is again increased by pressing the patient's jugular vein. This sign was very striking and demonstrated several times, although it lasted not very long after the lumbar puncture. However, it is very hard to draw a conclusion on a single case. On account of the lack of available cases, further experiment and confirmation have not yet been carried out.

Hyperaemic discs were found in the cases I and IV, choked discs in II and III. Owing to lack of eye ground examination on case II during the early period of disease the exact condition of the discs was unknown, although they were discovered to be choked, while the patient had symptoms of meningitis.
Leucocytosis was present in all four cases. The highest count in case I was 32,000, in case II 23,000 in case III 24,000 and in case IV 28,400. The average count is therefore 26,850 with the average percentage of polymorphonuclear cells 87 per cent. The total count varied tremendously in the course of the disease and paralleled the curve of the temperature, as did also the pulse rate; the most rapid pulse among our cases running as high as 158.

Headache was present in all cases, but case II did not have it until the symptoms of meningitis appeared. The headache was dull in character and mostly located on the affected side.

Our cases showed clear mentality throughout the course of disease, except that case II had slight drowsiness during the late period and following the onset of meningitis.

Don M. Campbell1 gives the following opinion concerning the treatment of lateral sinus thrombosis: "But little time need be consumed in discussing the treatment of the lateral sinus thrombosis, for, once the diagnosis is established, the management of the local situation is a purely surgical problem as far as the sinus thrombosis is concerned. My own opinion, based upon a fairly long and what might be said to be reasonably wide experience, is that by all means the jugular vein should be ligated in the neck and resected above the facial vein, and that it should be done as the initial procedure in the operative technique, and before the sinus in opened, but after it is exposed."

The ligation of the jugular vein was done on every case of our series at the level of the hyoid bone above the facial vein but there was no resection of the vein as there was no sign of phlebitis or thrombus formation in the jugular vein. The skin incision was made along the anterior border of the sternomastoid muscle. The vein was ligated with a single ligature of heavy silk, after the sinus was exposed, but before it was incised. The cervical wound was closed after the ligation, without drains. It should be borne in mind that gloves and instruments should be changed after the exploration of the mastoid as the operation on the neck should be done under strict asepsis. All precautions were not sufficient, however, to prevent an infection in the neck of case IV. Whether the infection gained entrance through the operative wound or, as the surgeon suggested, through the deeper tissues of the neck from the jugular bulb, will never be known.
The sinus wall is usually exposed as much as possible and the incision made along the long axis of the sinus. If free bleeding can be obtained as in case I, tampons of iodoform gauze should be packed into both ends of the sinus after the cut edges of its wall are turned inward. Because the content of the sinuses of cases II, III and IV was infected and no bleeding could be obtained from either one end or both, of the sinus, the occluded end was drained with an iodoform gauze strip which was changed as soon as it was soaked. Subsequently a fine rubber tube was inserted through either end of the incised sinus for the drainage of the content in the sinus and the jugular bulb. The pus in the jugular bulb could be sucked out during the dressing of the wound with a fine rubber tube attached to a Dakin's syringe. The end of the rubber tube should be smooth, not too long, because it may push the organized thrombus to the other side of the sinus. The outer end of the rubber tube was threaded and fixed on the dressing in order to prevent slipping into the sinus. The rubber tube drain was used in both ends of the sinus in cases III and IV and only in the lower end of the sinus of the case II, because there was free bleeding from the upper end of the sinus. The rubber tube should be shortened according to the advance of the healing process in the sinus, and then it should be replaced by a rubber dam until finally the drain in the sinus can be discarded. Cases III and IV were treated to advantage by this procedure.

Chase (2) makes a statement in regard to blood transfusion as follows: “Blood transfusions have become a recognized procedure in the treatment of sinus thrombosis and are not only of great value in those cases of bacteremia with a doubtful thrombosis but are bactericidal and supportive in cases of obliteration of the lateral sinus and in cases of ligation and resection of the internal jugular vein following a mastoidectomy in which intermittent temperature persists.” Three of our cases had blood transfusion during the course of the disease. In case I, the chills and rise in temperature, after the ligation of the jugular vein, no doubt, were due to bacterial invasion in the blood stream, from some focus of infection, probably not from the sinus. After the transfusion of 400 cc. of whole blood the temperature came down to the normal level with a negative blood culture. However, in case II, the patient had intermittent temperature after the ligation of the jugular vein and received
two transfusions with little response. In case IV, the blood transfusion failed to bring the temperature down, because the subcutaneous infection in the neck had just started to spread.

**CONCLUSIONS**

1. 1.03 per cent of 387 operated cases of mastoid infection developed lateral sinus thrombosis following an acute exacerbation of a chronic process. The location of the thrombus in the lateral sinus was in the proportion of 3 on the right side to 1 on the left.

2. A thrombosed sinus loses its smooth and shining appearance.

3. Constant signs or symptoms of lateral sinus thrombosis as shown in four cases are high remittent temperature, chills, leucocytosis, change in discs and positive Ayer-Tobey sign.

4. Severe chills preceding the sharp rise in temperature are almost always present, but profuse sweating after the crisis may be absent. The intermission of the temperature is very marked, but its characteristic curve may change, when complicated with meningitis. The temperature may rise once, or several times during twenty-four hours.

5. Positive blood culture is an important factor for diagnosis, although it may not mean very much when it is negative. It is preferable that a blood-culture be taken during the rise in temperature.

6. Leucocytosis is very high and its average count is 26,850. The average percentage of the polymorphonuclear cells is 87 per cent.

7. Pulse rate is rapid and parallels with the curve of temperature.

8. Headache is a common symptom. It is dull in character and usually located on the affected side.

9. Headache in one case was exaggerated by Dr. Dunlap on pressing the sound jugular vein shortly after the lumbar puncture. This sign may be very helpful in sinus thrombosis as an aid to diagnosis.

10. Mentality is clear throughout the course of the disease, unless it is complicated by meningitis.

11. The discs may undergo the change from a slight hyperaemia to a definite choking.
12. When the lateral sinus is partially obliterated, the pressure of spinal fluid during lumbar puncture rises slowly and in steps on compression of the affected jugular vein and stays high on releasing the pressure from the neck.

13. If the operation is made at an early stage, the chances of a successful result are fairly good, provided the patient has no other intracranial complications.

14. The jugular vein may be ligated without subsequent resection. It should be done after the sinus is exposed, but before it is incised. To expose the horizontal portion of the sinus for the purpose of dislodging the thrombus may not be necessary. The cervical wound can be united entirely and primary union successfully obtained, if aseptic precautions are put into practice.

15. Infectious contents of the lateral sinus may be drained with a fine rubber tube and the secretion in the jugular bulb may be sucked out with a rubber tube attached to a Dakin's syringe. The drain in the obliterated sinus with suppurative contents should be changed as soon as possible. However, the tampon in an incised sinus with free bleeding should be left in place for a few days.

16. Blood transfusion should be given after the ligation of the jugular vein, if the intermittent temperature persists.

REFERENCES
CAVERNOUS SINUS THROMBOSIS OF OTITIC ORIGIN

With Report of Two Cases

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While cavernous sinus thrombosis occurs most frequently following suppuration of the orbit, nasal accessory sinuses, and soft parts surrounding the nose, it is not unusual to find it complicating diseases of the ear. Most observers believe that cavernous sinus thrombosis, following infection of the ear, is always secondary to thrombosis of the sigmoid sinus or jugular bulb. In the cases reported below it is difficult to say, in the absence of post mortem examinations, that sigmoid or jugular bulb thrombosis existed before the signs of cavernous sinus thrombosis appeared. In neither case was the clinical picture that of sigmoid sinus thrombosis; while in the second case, no blocking could be found on compression of jugular veins.

These cases are admittedly incomplete without post mortem examinations, but it has seemed wise to report them on account of the rarity of thrombosis of the cavernous sinus.


H. C. F., male, age 17, was admitted to the hospital September 27, 1926, for pain in the left ear and swelling behind the left auricle.

The history of the present illness showed that the patient had had discharge from the left ear, at intervals, for ten years. He was first seen in the out patient department, about nine days before admission, at which time he had had profuse discharge and severe pain for five days. Local examination revealed a swelling behind the left auricle, with tenderness over the mastoid. The external auditory canal was swollen and contained many furuncles. Mastoid operation was advised at that time, but the patient refused. The furuncles were incised. The patient finally entered the hospital for treatment.

Physical examination on admission showed a moderately developed and nourished boy, complaining of earache and
tenderness over the right mastoid on pressure. Temperature was 37°C, pulse 80, and respiration 20. His mentality was clear, cranial nerves normal, and there was no rigidity or retraction of the neck. Eyes, nose and throat were negative. The right ear drum was normal; the left almost gone. Thick pus and cholesteatomatous materials were found in the middle ear. The swelling of the auditory canal had subsided, but there was a fluctuating swelling behind the left auricle, and two abscesses over the mastoid—one over the mastoid antrum, and the other over its tip. Leucocytosis was 11,400, with 82 per cent polymorphs. An emergency simple mastoidectomy was performed on the day of admission. About 30 cc. of thick fluid pus was evacuated under pressure. The mastoid was found destroyed by cholesteatomata and partially filled with granulations. An area of lateral sinus was exposed by the disease just below the perforation of the mastoid cortex. The mastoid cavity was curetted and the sloughing tissue removed. Culture of the pus showed B. proteus. The patient progressed fairly well, and the wound of the mastoid was kept wide open for a further radical operation, which was performed on October 13, 1926, fifteen days after the first operation. No dura was exposed, and the previously exposed sinus was fairly well covered with granulations. Skin graft was applied to the mastoid cavity by using a paraffin gauze mould. The skin was obtained from the inner surface of the left thigh. The patient had a sudden twitching of the left side of face during the operation.

The next day he complained of headache and dizziness, and vomited twice, but there was no facial paralysis. Spontaneous nystagmus to the right side was noted when the eye looked to the right, but no other pathologic signs were detected. Pus discharged from the lower end of the mastoid wound, as it was opened and the drains were removed from behind. The skin graft had almost sloughed off except for small pieces on the facial ridge. The temperature at this time began to rise and on Oct. 19 reached 40°C.

On October 20 a stiffness of the neck appeared and positive Kernig’s sign, but no localizing signs of cerebellar or temporal abscess. He was mentally clear. The total count of white cells was 19,050 with 95 per cent polymorphs, but there were no chills. On spinal puncture, the fluid which came out under normal
Case I: Chronic suppurative otitis media. Chronic mastoiditis, mastoiditis, Mastoid fistula, Cerebrospinal meningitis, Thrombosis of cavernous sinus.
Case II: The operated mastoid is on the left side. The protrusion of the right eye ball is more marked than the left.
Cavernous Sinus Thrombosis of Otitic Origin

pressure, was cloudy and gave a cell count of 21,800. Culture of the fluid was negative.

22 cc. of 1 per cent mercurochrome solution was given intravenously on October 21 and 18 cc. on October 23. At 8 p.m. on October 23, the patient became unconscious, with protrusion of the right eye.

On October 24 he was still unconscious, the protrusion of the right eye becoming more marked. There was flaccid paralysis of the left upper and lower limbs with exaggerated tendon reflexes and ankle-clonus, also bilateral Babinski's sign, and at times a slight involuntary jerking of the right limbs. Pupils did not react to light. Examination of fundus showed hyperaemic discs with beginning of choked discs. A combined cistern and lumbar puncture was made by the neurologist and the spinal subarachnoid space thoroughly washed with 70 cc. of normal saline.

Patient died on October 25. There was no necropsy.


H. C. P., male, age 32 was admitted on September 8, 1930, for pain in the left ear for 7 days and swelling behind the ear.

The history of the present illness showed that about seven days ago the patient had an itchy sensation in the left ear and that he used a stick with cotton to clean the ear canal. One day later, there developed pain in the ear canal, which increased in severity as time advanced. The patient felt feverish for four days and had tenderness over the mastoid for two days.

The family history was negative. Patient gave no previous history of otorrhea or furuncles in the ear and he denied venereal exposures. Later a friend of the patient stated that he had had running ear for several years.

Physical examination on admission showed a well-developed and nourished adult complaining of earache and tenderness over the left mastoid on pressure. Temperature was 38.2°C. pulse
100 and respiration 24. His mind was clear and co-operative. He was somewhat restless, but this was thought to be due to earache. Examination of the ears disclosed that the right ear was normal, but that there was a swollen mass on the posterior wall of the left ear, covering up the posterior portion of the ear drum. This mass was incised before admission in O. P. D. and a little pus obtained. The ear drum was partially seen to be congested, but without bulging. Heart and lungs were normal. Eyes were negative except for a slight protrusion. The abdomen and extremities were negative; the nose and throat normal. White cell count was 11,590, urinalysis negative.

The following day a paracentesis of the left ear drum was again performed and much thick pus evacuated. In spite of the drainage of the middle ear the temperature rose to 40.2°C. in the afternoon, and the swelling over the mastoid was very marked, and extending toward the neck. The X-ray examination of the mastoids reported them to be normal on the right side; but on the left, of a mixed cell type, and generally cloudy, with clearly visible cells in places. Culture of the discharge showed staphylococcus aureus. Emergency mastoidectomy was performed under ether anesthesia. Thick pus escaped under pressure. Necrotic cells were found around the antrum. There was no exposure of sinus or dura.

September 10, the ear drum was still congested, but without bulging. Much thick bloody purulent discharge appeared in the ear canal. The mastoid wound was irrigated with Dakin's solution and much fluid came out from the middle ear, demonstrating that the communication between the mastoid cavity and the middle ear was quite free. The leucocytosis was 9,200 with 66 per cent polymorphs.

September 15th the patient became drowsy, but co-operated well when aroused. Complained of headache, had not vomited. Blood culture taken on September 11 was reported to be positive for staphylococcus with 2 colonies per cc. Blood Wassermann was strongly positive. Left eye ball showed slightly more protrusion. Palpebral fissure of the right eye was wider than that of the left. Extraocular movements were limited in internal, upward and downward directions on the right side; external movements
were also limited, but to a much less degree. Fundus examination showed normal discs, but the retinal vessels were tortuous and slightly engorged, more so on the right side. Neurological examination revealed no paralysis of the extremities. Motor power seemed equal on the two sides. Suboccipital tenderness was very marked, apparently due to the local cellulitis below the mastoid wound. Rigidity of the neck and Kernig's sign were present. In the afternoon the exophthalmos was definitely increased on the right side. Edema of the eyelids was present. The spinal fluid obtained from lumbar puncture was grossly turbid but gave no growth on culture. Jugular compression showed no block on either side. The cell count of the spinal fluid was 1350 per cmm. with 90 per cent polymorphs. Pressure was 250 cmm. of water; leucocytosis 11,350. Cavernous sinus thrombosis was diagnosed and it was probably secondary to meningitis. Lumbar puncture was repeated, the character of the fluid and the pressure being about the same.

September 16, temperature remained as high as 40°C. Patient was semiconscious and absolutely deaf. The second blood culture taken on September 15 was again positive for staphylococcus aureus with 134 colonies per cc. Leucocytosis was 27,500. Patient went home, against advice, in a hopeless condition on September 17th.

**COMMENTS**

**Case I.** Apparently the patient was making a satisfactory recovery until the second operation was performed.

The young operator in this case had just returned from Boston where the paraffin gauze mould was being used as a means of applying a skin graft and was anxious to try out the method. The mastoid wound was apparently clean and there did not seem to be any contraindication to such a method. This method has been used frequently abroad with success although one of the writers remembers one case in Boston which was lost from meningitis, following its use.

The complaint of headache and dizziness with vomiting and spontaneous nystagmus on the day following skin graft is suggestive of an acute labyrinthitis.
The labyrinthitis was followed by first a localized and then a generalized meningitis with possibly a localized abscess of the left middle lobe.

Protrusion of the right eye was first noticed ten days after the application of the skin graft; and it should be noted, was on the opposite side to that of the operated ear. Had there been direct extension from the left sigmoid sinus one would have expected that the left cavernous sinus and left eye would have shown signs before the right, also that there would have been some signs of thrombosis about the left eye. In the second case a somewhat similar thing occurred. While the eye on the side of the infected ear first showed protrusion it was the eye on the opposite side which finally showed the greater protrusion. Again there were no characteristic signs of sigmoid sinus thrombosis but these might have been masked by the meningitis.

This case has been included as one case of intracranial complications of middle ear disease of which a report was made by Y. L. Cheng and published in the *China Medical Journal*, Vol. 43, No. 11, Nov. 1929.

**Case II.** This patient was extremely ill on entering the hospital and became progressively worse during his stay.

Both eyes showed slight protrusion on admission, the left protruding more than the right. The significance of the finding was not appreciated until late.

The swelling behind the ear was unusual in that it extended well beyond the limits of the mastoid and down into the neck. No localizing abscess could be discovered nor was it relieved by opening the mastoid.

Jugular compression at the time lumbar puncture was performed did not reveal any degree of blocking on either side. There were no characteristic signs pointing to sigmoid or jugular bulb thrombosis. Until the terminal stage leucocytosis was not high.

**Conclusions**

Two cases of cavernous sinus thrombosis of otitic origin are presented here primarily for the purpose of recording the presence of this condition in our clinic.
Typhoid and Paratyphoid Fevers in Chengtu

The clinical course of these two cases leads us to conclude that infection of the cavernous sinus took place without involvement of the sigmoid or jugular bulb.


INTRODUCTION

Up to about ten years ago, it was claimed by many that there was no typhoid fever in Szechwan. Just who was responsible for initiating this theory, no one seems to know, and it does not really matter. However, some conditions here have,
until recent years, lent themselves all too readily as soil for the growth of this erroneous idea. In the first place, it does seem true that typhoid fever in Chinese differs somewhat to that in Westerners. The so called “rose spots” are rarely seen (some say never) and the enlargement of the spleen seems somewhat less marked. Secondly, in Szechwan, the prevalence of malignant malaria, the common occurrence of the typhoid type of miliary tuberculosis together with the distinct possibility of there being one or two “Unknown Fevers” peculiar to Szechwan still further confuse the picture. Another factor undoubtedly is that until recent years there has been a decided reluctance on the part of the Chinese public to send serious “internal medicine” diseases to the foreign hospital, and Szechwan is probably even more conservative than any other province in China. In typhoid as in other cases there could be only two possibilities, they either died or they got better and in neither case was there need to go to the hospital. Furthermore, until recently postmortems have been very rare in this province, so that there was no opportunity to confirm any case being typhoid. Indeed even were postmortems more possible, the Chinese reluctance to have any case die other than at home would negative the possibilities that autopsy might afford for proving diagnosis. There has to be a body before there can be an autopsy, and that body must be in the hospital as an autopsy performed in the home would be unthinkable because of the present mental attitude of Chinese society.

But the above is of little importance compared with two facts, first, that until very recently practically no Mission hospital has had adequate laboratory facilities and second, the physician in charge of the hospital has been usually too swamped with multitudinous extraneous details to give his laboratory the personal supervision necessary to make it really worth while.

Even before the advent of the Widal a number of us felt that typhoid occupied no small place among the so called unknown fevers here. Facilities for doing daily and repeated Widal tests have amply confirmed what could formerly be nothing more than a suspicion. For various reasons a study has not hitherto been possible and the number of cases submitted are correspondingly small but they do make one thing clear
that is we do have a good deal of typhoid fever here in Szechwan. It is rather interesting to note just here that many years ago few believed that appendicitis was not common amongst Chinese. Increased confidence in the foreign hospital and increased faith in the judgement of the Western trained doctor has relegated that conception to the scrap heap. In its place has appeared what seems to us but misconception and that is that appendicitis is on the increase amongst Students. Should it not rather be that insomuch as students are more susceptible than their fellows to new ideas they have been the first to accept the modern attitude of Western Surgeons? Correspondingly one may prophesy that in the near future when the Chinese general public appropriate this new idea for themselves there will be a decided “increase” (?) in the incidence of appendicitis among Chinese. We feel that the same is bound to occur in regard to future typhoid statistics in Szechwan.

The cases here given are obtained for the year 1930 only and are from the Men’s Hospital belonging at present to the United Church of Canada. Because the Women’s Hospital near by admits children 10 years of age and under, no cases under 10 years of age are admitted to the Men’s Hospital. Therefore the present report does not cover data of children under 10 years. Owing to the temporary lack of sufficient laboratory staff we were not able to carry out all the stool and blood cultures we should like to have done.

The series for the 12 months amounted to 32 cases, and the total admissions to the hospital during this period were 1369 cases. This gives 2.34% of all admissions in this hospital as typhoid. Taking the 717 surgical cases from 1369 leaves typhoid and paratyphoid fevers as 4.9% of all medical cases.

Age Influence:

Out of the 32 cases the youngest was 15 and the oldest 48. Those between 15 and 30 years of age were 69%. This was a little lower than that given by Jennings who reported approximately 70 to 75% of all cases occurring between the age of 15 to 30, as cited by Wylie.

Occupation:

From the recorded occupations of the 27 cases 58% were students. Wylie gave a percentage of 46% amongst students.
The high incidence of typhoid infection among the students may be explained on two bases: one, that most of them here came from other districts and as they had no home to go to, they could not but stay in the hospital when they were sick; the other, that as already mentioned students begin to believe in the Western physician earlier than most other people. Soldiers gave a percentage of 25%. This high incidence might be attributed partly to their low standard of living but mostly to their unsanitary habits and surroundings. Their habits of defecation in open air and the nearness of these feces to the kitchen and "dining room" coupled with the ever present fly, doubtless plays no small part.

Seasonal Incidence:

In these series there were three cases during the spring, eight during summer, twelve during autumn and eight during winter. The cases which occurred during August, September and October were 43.7%.

Modes of Infection.

1. During the summer and autumn months people here are very fond of drinking a good deal of unboiled sweetened water and lately "soda" drinks prepared from unboiled water. This water usually comes from wells opening flush with or even below the level of the ground. Furthermore, too often these wells are located near public lavatories or close to sewage ditches. Last year the West China Council on Health Education made some bacterial examinations of a number of wells in Chengtu and it was found that about 80% of the wells were highly contaminated.

2. Fruit sellers usually peel the skin off their fruits and keep them sprinkled with unboiled water, and vegetables are often consumed by the general public raw or partly so.

3. Restaurants as a rule do not keep their food covered and so flies are free to settle on the food ad lib.

4. Public lavatories are usually wide open and established on almost every street. Their construction is most unsanitary, the feces being freely accessible to flies both as breeding places and as distributing centres from which germs which habitate human feces are distributed "per fly foot" to the adjacent fruit stands, food shops etc.
Symptoms and Signs:
The prominent symptoms in this series were fever, headache, loss of appetite and general weakness. The spleen was palpable in 46.2% of cases. No rose spots were observed.

Diagnosis:
In this connection aside from the insidious onset we should like to emphasize the following points:

1. White blood cell count: The white blood cell count was well below 6500 per cmm in 63% of the cases, the average being 5860. The four typhoid B cases gave an average count of 8650. Unfortunately in one of the Paratyphoid A cases the white cell count was not recorded while the other Paratyphoid A gave a white cell count of 13,800. However the latter was complicated by bronchopneumonia and probably this accounted for the high count.

2. Widal reaction. In our laboratory we use the microscopic method for the Widal test. This method consists in diluting the patient's serum with normal saline up to 1 in 20, 1 in 40 and 1 in 80, and mixing with one drop of the different dilutions of living cultures of the different types of typhoid bacilli. After making the hanging drop preparation it is incubated for 30 minutes and then examined under the microscope. The specimen, after allowing it to stand for two hours, is read again. The bacteria in positive cases can be easily seen agglutinated in masses while the negative cases show the bacteria freely and evenly distributed throughout the field. Our stock cultures were originally brought from the Temple of Heaven Laboratories and from these we grow our own.

In the series of 32 cases the Widal test was performed in 27 cases. Out of these 27 cases there were seven negatives. However these cases were clinically typhoid (Intestinal hemorrhage, etc.) In 27 cases the Widal test showed 13 cases positive for B. typhosus (48%), four for Paratyphoid B (14.87%), and two for Paratyphoid A (7.4%) and one for B typhosus and Paratyphoid B. One of the Paratyphoid A showed a doubtful reaction on admission, that is, nine days after the onset of the disease, but three days later became positive with paratyphoid A, while the other gave a positive result on two separate occasions. These findings suggest that Paratyphoid A does exist
in West China, though some consider it to be rare. However further data is necessary before any generalization may be ventured.

3. The pulse—temperature ratio. As a rule the rise of pulse rate in typhoid cases is not proportionate to the rise of temperature as compared with other fevers (An increase of 10 heart beats per minute for every 1° rise of temperature). The average of temperature in these cases varied from 100.2 to 100.4 while the pulse rate was from 99 to 103, that is to say there was an average increase of only 6 beats per minute for every 1°F rise in temperature.

Complications.

There were five cases with intestinal hemorrhage (15.6%) four with bronchopneumonia (12.5%) and there were five deaths (15.6%). The relative high death rate was probably due to the fact that most of the cases when admitted were far advanced.

Treatment.

According to Wylie the intravenous injection of mercurochrome produced favourable results in his hands. About five years ago we tried mercurochrome injections on several typhoid fever cases and the results we obtained were not encouraging. It seems to us that if mercurochrome is given when the fever is high the consequent reaction may endanger the patient’s life. On the other hand if the temperature tends to decline the mercurochrome injection appears to be unnecessary. Some hold that mercurochrome given during the first week when the bacteria are still in the blood stream may give very bizarre results. Usually our cases have been well into the second week on admission but it is certain in not one case could we say benefit resulted from mercurochrome injections. Moreover, St. George showed that the margin of safety between the therapeutic efficiency and toxicity is very narrow indeed. He stated "*That its dangers are constantly to be borne in mind is apparent from the foregoing case reports in that mercurochrome in its therapeutic dose not only exhibited no curative effect, but produced lesions associated with a toxicologic agent and the margin

of safety between a therapeutic and toxic dose must be variable and small indeed." We attach greater importance to dieting, hydrotherapy and good nursing than to any specific medication.

**Summary**

1. There were 32 cases studied in which four were paratyphoid B, two were paratyphoid A and twenty six typhoid.

2. There were 43.7% cases during August, September and October, 69% of cases between the age of 15 to 30, 46% among the students and 25% among the soldiers.

3. The outstanding symptoms were fever, headache, loss of appetite and general weakness. The spleen was palpable in 46.2% of cases.

4. The average white blood cell count was 5880 and 63% were below 6500. In paratyphoid B the average white cell count was 8650.

5. The Widal test positive for typhosus bacillus was 48%.

6. The pulse was increased but not proportionate to the usual fever rise, being only six beats per minute for every 1°F rise of temperature.

7. Intestinal hemorrhage was a complication in 15.6%.

8. The death rate was 15.6%.

*Note:* We should be glad if this report could have been for a large number of cases or have covered a number of years. It has little justification save for definitely establishing that there is typhoid in Szechwan at least on the Chengtu plain and hinting that the incidence may not only be high but also widespread.
Malaria as Three Diseases

Before passing to a consideration of the different factors affecting the laboratory diagnosis of malaria, it may be well to emphasis that the term 'malaria' applies to three diseases, and not to one. Morphologically, the difference between \textit{P. vivax}, \textit{P. malariae} and \textit{P. falciparum} are well established; so much so that several workers have suggested that the parasite of sub-tertian malaria should be placed in a separate genus, \textit{Laverania}. In benign tertian and malignant tertian infections the red blood corpuscle, when suitably stained, always shows stippling in benign tertian infection, and sometimes in malignant tertian infection. This stippling is absent, in our experience, in quartan infection.* This stippling undoubtedly means some action, probably deleterious, on the erythrocyte membrane, but its nature is not in the least understood. In \textit{P. vivax} infections, as is well known, the infected cell is enlarged, whilst in \textit{P. falciparum} infections there is a special tendency for the infected erythrocytes to agglomerate together, and to adhere to the walls of internal capillaries, resulting in the latter becoming blocked, this leading to the more serious symptoms associated with an attack by this species of parasite.

*It has recently been shown by S. P. James that, by suitable staining methods, a very fine stippling can be demonstrated in red blood corpuscles infected with \textit{P. malariae}. (Trans. Roy. Soc. Trop. Med. & Hyg., 1929, XXIII, No. 3, p. 269.)
The incubation periods with the three species are generally different. Stitt (1929, p. 36) gives approximately three weeks for quartan infections, two weeks for benign tertian infections, and 8 to 12 days for malignant tertian infections. These periods, however, may be much longer. Paresis cases inoculated with *P. vivax* gave incubation periods of from 5 to 31 days. This is not in accordance with the personal experience of the second author of the present *Memoir*, with whom infection with *P. vivax* on two occasions has shown itself in both instances in exactly 11 days. A person infected with one species of parasite is still susceptible to infection with the other two, though Taliaferro, Taliaferro and Fisher (1927) have shown that all three species react to the same antigen. James, Nicol and Shute (1929) produce evidence that there are individual races in *P. vivax*, and in the opinion of some workers in India, *P. falciparum* has different strains or races, associated with slight differences in morphology, and considerable differences in symptomatology.

The symptomatology of the three infections is different. Infection with *P. malariae* is usually mild, the parasite counts being low, but this infection tends to be extremely persistent. Instances of relapse up to nine years have been recorded. At autopsy the spleen and liver are not markedly pigmented, the parasites are not found in the brain tissues, nor do they tend to accumulate in any organ. Many authors believe that quartan infection is associated with the highest degree of splenomegaly. Further, for reasons which will be shown in a subsequent section, *P. malariae* appears to be the first parasite species to disappear under anopheline control.

In the case of infection with *P. vivax*, these patients as a rule show the highest degree of pyrexia. Stitt (1929) states that the paroxysm in benign tertian malaria lasts for 10 hours. Herpes labialis is almost pathognomonic of infection with this parasite. Vomiting and joint pains are common symptoms. The patient is characteristically well during the afebrile day. The sense of chill is very marked in benign tertian infections, whilst a well marked rigor is characteristic of both benign tertian and quartan infections. Relapses are almost as characteristic of benign tertian infection as of quartan infection, and are especially common in the spring. Death is very rare in
benign tertian infection, but does occur. At autopsy the bone marrow, kidneys, and spleen are found to be pigmented.

In the case of infection with *P. falciparum* the temperature in a normal case is usually below 103°F., and when *P. falciparum* infection has been diagnosed microscopically, any rise above this figure is a danger signal. Hyperpyrexia up to 110°F. however has been recorded. As Stitt says 'in malignant tertian malaria the patient is sick, and does not have a "well day."' The paroxysm is ill-defined lasting about 20 to 36 hours, and there is the well known double peak in the two-or-four-hourly temperature chart. The cold stage may be absent or suppressed—the 'dumb chill' described by Stitt. This may be correlated with its schizogony in the internal blood stream, but with regard to the various toxins produced by all three species we are profoundly ignorant. As is well known, pernicious symptoms are especially characteristic, in fact almost entirely confined to infections with this parasite, and may simulate a dozen other diseases. Cerebral, algid, choleraic, bilious remittent, pneumonic and cardiac types have all been described, and may supervene on the mildest beginning of the illness. The typhoid state is often simulated. Bronchitis and pneumonia—whether of broncho or lobar type—are often associated with this infection, and perisplenitis with a tender spleen is frequently encountered in the attack. The primary attack is often associated with leucopaenia, instead of leucocytosis, during the afebrile phase. The morbid anatomy of this infection fills pages in every textbook of tropical medicine. Relapses are not common in this infection, but have been recorded up to two years after the primary attack. In the three diseases Deaderick, quoted by Stitt (1929, p. 50), gives the following percentage of relapses:

\[
\begin{align*}
P. vivax & \ldots \ldots \ldots \ldots \ldots 65 \text{ per cent.} \\
P. malariae & \ldots \ldots \ldots \ldots 55 \ " \ " \\
P. falciparum & \ldots \ldots \ldots \ldots 45 \ " \ " \\
\end{align*}
\]

Finally, in connection with *P. falciparum*, is its reputed association with black-water fever. We are far from being convinced that this is definitely established. The senior author of the present Memoir considers that the cell inclusions described by Leishman (1912), which he has also seen himself at autopsy on a case of this disease, and which are apparently characteristic of it, may point to a filterable virus as its causative agent.
With regard to the response of these three species to drugs, there are well marked differences. *P. falciparum* in its schizogony cycle is admittedly the most amenable of the three to quinine therapy. The views held by Acton (1920) on cinchonidin as preferable to quinine for *P. vivax* infections are well known and are frequently applied. The resistance of the gametocytes of *P. falciparum* to any of the cinchona alkaloids is a matter of common knowledge. The organic arsenicals have a special value against *P. vivax*. Plasmochin only attacks the schizogony cycle of *P. vivax* and *P. malariae*, and is without action on this phase of *P. falciparum*. On the other hand, plasmochin especially attacks the gametocytes of *P. falciparum*, and, as Barber, Komp, Newman (1929) have shown, renders these incapable of infecting anopheline mosquitoes in doses so minute that the gametocytes are still viable in spite of it, as shown by their ex-flagellation *in vitro*.

The analogy of what is commonly called ‘malaria’ with what is commonly called ‘dysentery’ and the ‘enteric group of fevers’ is, we hope, sufficiently well brought out in the foregoing few remarks. We consider it just as erroneous to treat a case of ‘malaria’ without finding out the causative species, as to treat a case of ‘dysentery’ without finding out which of the several causative organisms of this disease is responsible.

It is the realization of this fact which has led us to preparation of the present Memoir. In general practice in India, since the vast majority of the infections encountered in the first eight months of the year are due to *P. vivax* or *P. malariae*, and since *P. falciparum* does not become of importance until September, it would be logical and very economical to use cinchona febrifuge only until September, and quinine thereafter. For many other parts of the world the seasonable distribution of species is not so well known, but unless and until such investigations are undertaken, such economies cannot be thought of. As far as the island of Ceylon goes, the administrative medical authorities might almost strike quinine off their indents for drugs; whilst the same state of affairs appears to apply to all countries and areas lying beyond the summer isotherm of 70°F.
The Factors underlying the distribution of the three human species of Plasmodium

We believe that the present-day distribution of the three malaria species throughout the world is best explained on the hypotheses that—

(a) *P. malariae* is the oldest species in the scale of evolution. It is now senescent, and is gradually disappearing. This is fully discussed in the foregoing pages.

(b) *P. vivax* was probably the second species to evolve. It is now in every way adapted to its environmental conditions. It reproduces and thus causes malaria both in the spring (relapses) and in the autumn (fresh infections). Its gametocyte output is at its maximum just prior to the commencement of the most favourable season for transmission, and thus it is the leading feature of the malaria picture at the beginning of the epidemic season. It is more adapted to man than is *P. falciparum*, and causes less clinical disturbance. It has succeeded in following man into higher latitudes and altitudes than has *P. falciparum*, owing to its adaptation to a lower atmospheric temperature. On account of all these reasons it is the most widespread of the three species.

(c) We regard *P. falciparum* as the species (if, indeed, it be not a separate genus) of most recent evolution and adaptation to a parasitic life in man. Its period of maximum output of gametocytes so frequently fails to coincide with the most favourable season for transmission that this suggests that its adaptation to environmental conditions is as yet incomplete. Its range is more restricted than that of *P. vivax*, and in many countries it is not of importance until the autumn; yet its high merozoite output means that it produces a much larger absolute number of gametocytes than do the other species, and it is therefore the parasite of epidemic malaria. The frequency of spontaneous cure in malignant tertian malaria apparently means that this species finds it more difficult to exist in the vertebrate host, to which it is not yet fully adapted, than do the other two species. Finally, it causes the most severe symptoms due to any of the three species—again an indication of its recent adaptation to man. Should it ever reach a relative gametocyte output equal to that of *P. malariae*, coinciding with the commencement of
the most favourable season for transmission, it might well exterminate mankind in the tropics, though we believe that long before its evolution attains this degree of perfection mankind will have found some generally applicable method of more perfect malaria control than at present exists.

Age and Malaria

Malarial prevalence may be of three different types: intense, moderate, or slight. The age distribution of the malaria present in any given area, accordingly, will vary with whether the malaria is hyperendemic or intensely endemic, moderately endemic, or only slight in the locality concerned.

In a hyperendemic area every child born in that area will contract malaria shortly after birth, and will go on and on contracting fresh infections. The spleen rates in such areas will be in the neighbourhood of 100 per cent among the younger children. As the child grows up, however, he becomes 'salted' to the disease and acquires a power of tolerance (rather than perhaps an actual immunity). In such areas parasite and splenic rates will be very much lower among adults than among children. Of such areas we can give numerous instances from the literature.

In areas where malaria is only moderately endemic, the reverse will hold. The chances of being bitten by infected anophelines will be increased with every extra year that the person lives in the area; here parasite and splenic indices will be low for young children, and higher for adults. Unfortunately, malaria has not been much studied in such areas, and very few examples can be found.

In areas where there is but little malaria the age distribution will be more or less as in a moderately endemic area.

Race and Malaria

We have already seen in the preceding section that the incidence of the different species of malaria may be quite different amongst different races living in the same area. For French West Africa in general the position is that the young children in the locality are extremely heavily infected with both *P. malariae* and *P. falciparum*, whilst the adult negro has attained a relative immunity, due to the effect of repeated
infections in childhood. There must therefore be every possibility of exposure to infection with *P. malariae* present in West Africa. Yet, when the white colonist goes out to West Africa, what he contracts is not quartan, but malignant tertian malaria.

**Mosquito Protection**

The type of house in which the person lives may very markedly influence his chances of picking up malaria. Attention to this is drawn by Boyd (1926) who examined a population of 2,570 persons living in 584 houses in a block of 141 square miles in south-east Missouri. He gives the following table:

<table>
<thead>
<tr>
<th>Houses</th>
<th>Population</th>
<th>Cases of malaria</th>
<th>Rates per 100 residents</th>
<th>Malaria cases per house</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tight house, good screens ..........</td>
<td>174</td>
<td>846</td>
<td>43</td>
<td>5.1</td>
</tr>
<tr>
<td>2. Tight house, poor screens ..........</td>
<td>146</td>
<td>812</td>
<td>95</td>
<td>11.7</td>
</tr>
<tr>
<td>3. Tight house, no screens ...........</td>
<td>48</td>
<td>246</td>
<td>47</td>
<td>19.1</td>
</tr>
<tr>
<td>4. Open house, screened ..............</td>
<td>88</td>
<td>408</td>
<td>52</td>
<td>12.7</td>
</tr>
<tr>
<td>5. Open house, no screens ............</td>
<td>53</td>
<td>258</td>
<td>61</td>
<td>23.5</td>
</tr>
</tbody>
</table>

None of the houses could be classified as ‘mosquito-proof’ in the true sense of the term, yet even so, partial protection is much better than none at all.

We do not think that the commercial communities in India have as yet realized the extreme necessity for screening the houses of their managers, etc., on malarious tea gardens, coal mines, etc. It is much cheaper to screen a bungalow than have to grant frequent periods of leave on account of chronic malaria.

J. G. Thomson (1924) comments on the same fact in connection with blackwater fever and malignant tertian malaria in Southern Rhodesia, and gives some very interesting photographs of ‘black-water houses.’ Some of these houses had to be abandoned altogether on account of the number of deaths from blackwater fever which occurred in them. "The effect of proper screening, looking after water supplies, using of nets, and lastly, the proper use of quinine," he writes, "is so obviously and so easily demonstrated that we can only conclude that this lack of precaution is due to carelessness, ignorance, or poverty. A hut could be so easily rendered mosquito-proof that the expense
would be extremely small. We can state as a fact that black-water fever occurs in direct relationship to the method of living and the amount of malarial infection. There can be no doubt but that many parts of Rhodesia, not yet explored by Europeans, will prove to be dangerous to the pioneers, unless precautions are taken during their development."

Hanafin (1928) has some remarkable figures for the results of mosquito-proofing the barracks of British troops in Lahore cantonment (Mian Mir). In adjoining barracks, which in former years had shown no difference in admission rates, the figures were as follows for August to October, the malaria season:

<table>
<thead>
<tr>
<th>Year</th>
<th>Admissions per 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proofed</td>
</tr>
<tr>
<td>1926</td>
<td>182.1</td>
</tr>
<tr>
<td>1927</td>
<td>45.6</td>
</tr>
</tbody>
</table>

These results have been obtained by what the second author of the present Memoir—having had experience of military mosquito-proofing at Delhi Fort—considers should probably be relegated to Boyd's second category of 'poor screening'; yet they are very significant.

**Has the patient had any quinine (or plasmochin) prior to examination of the blood?**

In our experience this is one of the greatest difficulties which the laboratory worker has to face, in India at least. The European and the educated Indian patient, when he contracts a chill, is accustomed first to take a small dose of quinine and then to send for the doctor. This dose of quinine is usually quite insufficient to control the fever, but sufficient to render it impossible to find malaria parasites in thin blood films. In such cases, however, the examination of thick blood films will often reveal parasites, whilst, in our experience, culture of the blood for malaria parasites is far and away the best method of arriving at a positive diagnosis in such cases.

The exact method of action of quinine on malaria parasites has been the subject of no end of discussion, but of very little direct investigation, and we do not propose to discuss the matter here. Whether the action of quinine be a direct or an indirect
one upon the parasites, however, there is no question that their morphology is completely altered under quinine treatment. On prolonged search of thin blood films from a patient who is on his first or second day of quinine treatment, it is not unusual to come across very scanty parasites, and such parasites are usually very much deformed and altered. We have not been able to find any papers dealing specifically with this matter, but any laboratory worker with considerable tropical experience must be very familiar with it. Plasmochin, presumably, will have a similar effect, but our experience with this new drug has as yet been but scanty.

McNabb and Stewart (1927) draw attention to the different effects of prophylactic quinine on *P. vivax* and *P. falciparum* infections respectively. The persons under observation were three companies of engineer troops sent into the unprotected zone in Panama to do survey work. They spent four and a half months in the jungle, and during the whole of this period were on prophylactic quinine. During this period only 14 cases of malaria occurred among the 225 men concerned. They then returned during May; prophylactic quinine was discontinued; and now a veritable epidemic of malaria set in among these men. 'The difference in the behaviour of the tertian and aestivo-autumnal infections during this period was striking,' write the authors. 'In the first two weeks after there was not a single case of tertian malaria, whereas aestivo-autumnal cases were numerous, reaching their peak in the second week. All aestivo-autumnal cases occurred within five weeks after quinine was stopped. Tertian cases on the other hand did not begin to show symptoms until two weeks had elapsed without quinine, and the incidence curve formed an irregular plateau extending over the second, third, fourth and fifth weeks in which no quinine was taken. Furthermore, tertian infections did not disclose themselves clinically within a reasonably short time after quinine was withheld, but continued to develop throughout the seven months' period of observation.'

This paper shows how prophylactic quinine may affect the laboratory findings. 'The type of malaria must be considered in estimating the value of prophylactic quinine. Apparently aestivoautumnal malaria is easier to prevent than tertian.'
Studies in the Parasitology of Malaria

Somewhat similar findings are recorded for school children at Dakar in French Senegal by Leger and Bedier (1924). In June 1922, 210 school children at Dakar and Medina were examined. There were found 1 infection with P. vivax, 33 with P. malariae and 68 with P. falciparum. Prophylactic quinine was now given three times a week to each child from October to July. At the end of July, 1923 the children were re-examined; 21 to 23 per cent were found to be still infected, but in all instances the infection present was one with P. falciparum.

Both these papers show that administration of quinine prior to making the blood examination may suppress one species of parasites rather than another, and confuse the findings.

The question of relapses whilst under quinine treatment has been very widely discussed, and we do not propose to go into the matter here. Fletcher (1923) has brought forward very strong evidence that 'quinine-resistant' cases are simply cases that, for one reason or another, are either not getting or not absorbing the quinine prescribed. Ross and Thomson (1911) describe cases of malaria in which during the course of full quinine treatment, the patient gets a recurrence of fever, but no parasites can be found in the blood; they call such cases 'pseudo-relapses.' On the other hand the same authors (Ross and Thomson, 1912) later describe what was apparently a case of true parasitic relapse during vigorous and continuous quinine treatment. The patient was a seaman, born in Canada, who had contracted malaria in the Amazon region, and was treated at Liverpool. On admission to hospital he had fever, and blood examination showed both P. vivax and P. falciparum to be present. He was now given 30 grains of quinine hydrobromide in solution by the mouth daily for seventeen days. No parasites could be detected after the fifth day. A recurrence of fever now ensued. Thinking that this was one of the pseudo-relapses previously described, the authors now withheld quinine. On the 21st day, however, blood examination showed sexual forms of both P. vivax and P. falciparum; the patient was very seriously ill, and quinine treatment had to be resumed. An examination of a 24-hour specimen of the urine showed that the patient was excreting about 13 grains a day out of the 30 grains a day administered.
One last and most curious effect of quinine administration has to be mentioned. It appears to increase the number of crescents in the peripheral blood in the case of an infection with *P. falciparum*. Attention to this is drawn by Clark (1927). Working in the littoral of the Caribbean sea during April to September 1926, he found a general gametocyte rate of 13.5 per cent—mostly crescents. On the other hand a series of 124 cases from 8 hospitals examined showed a gametocyte rate of 45.9 per cent—mostly crescents. These were afebrile patients who had been under full quinine treatment. 'It is my belief,' he writes, 'that the degree and promptness of gamete invasion of the peripheral blood stream following a vigorous use of quinine in aestivo-autumnal fever is not very generally known, and that the long period over which many treated cases show a persistence of gametes in the peripheral blood is also not widely understood. These are very important facts to be kept in mind by those of us who are attempting to control malaria in the tropics.'

**Technique in the preparation of blood films**

Almost everything depends upon the technique observed in preparing, staining, and examining blood films in work on malaria. The differences in this matter are amazing. In teaching the D. T. M. classes at the Calcutta School of Tropical Medicine during the last nine years we have been especially struck with the differences which prevail in technique; one student will make a blue smudge of a stained blood film, in which he will be able to see little or nothing; another will get an almost perfect result.

**Preparation of the film**

In making a thin blood film the blood should always follow the spreader, and never be pushed in front of it. The best way of ensuring this is the method taught at the Karnal Annual Malaria Class. The spreader is approached to the drop of blood in front of the drop, but not touching it. It is then pulled back into contact with the drop, and after the blood has spread by capillary action between the slide and spreader, the spreader is then pushed forward to make the film, drawing the blood after it. By this method there is absolutely no chance of pushing the blood. If the latter method be adopted very considerable
Studies in the Parasitology of Malaria

Distortion of the parasites may occur. This is especially true in infections with *P. vivax*, where a heavy hand may rupture the chromatin of gametocytes and give rise to most misleading appearances. Crescents in films often or even usually appear as if they were extracellular; and this fact we attribute to the rupture of the thin investing membrane of the erythrocyte in spreading the film.

**Fixation of the films**

The fixative almost universally employed for fixing blood films for staining in the tropics is pure methyl alcohol. Now the keeping properties of this fixative in the moist tropics are known to be poor. In order to investigate this point a 15 c.c. phial of Merck's methyl alcohol *purissimum* was opened and kept opened on the laboratory bench in Calcutta during the monsoon period in September 1929. A batch of blood films was taken simultaneously from a patient suffering from benign tertian malaria and was kept in a desiccator. Each day two films in this series were fixed by the specimen of methyl alcohol in the opened phial and stained by Giemsa's stain, the same brew of stain being employed throughout.

The results were depicted graphically in the coloured-plate. It will be seen that staining became progressively worse until, at the 6th day after the phial had been opened, the fixation was hopeless. Schuffner's dots were not brought out on the 3rd day. The contents of the phial were chemically tested for us daily by Dr. Sudhamoy Ghosh, Professor of Chemistry, Calcutta School of Tropical Medicine. He reports that at no time could he detect any trace of acetone, and only on the 10th day was there a sufficient trace of formic acid to yield a faintly positive reaction on testing. He attributes the loss of fixative power in all probability to absorption of water from the atmosphere. On the other hand the second author has had the same trouble, keeping the opened phial in a desiccator.

For workers with only few or occasional films to stain and examine the moral is that methyl alcohol should be kept in small 5 c.c. ampoules, and these should not be used after the 5th day from opening.

Pawan (1928) has encountered a different source of trouble. He states that in the tropics a trace of alkalinity in the distilled
water employed is injurious. This is derived from the glass of the soda-glass vessels in which stains and distilled water are kept. He advocates keeping the Leishman or Giemsa stain in an ordinary glass phial, and the distilled water in a Pyrex glass bottle (the British agents for Pyrex glassware being J. A. Jobbing & Co., Sunderland). The best results however are obtained when both the stain and the distilled water was kept in Pyrex glass phials.

Staining of the film

If technique in the preparation of the film is of importance, the method of staining is of even greater importance. Appearances differ very much in a lightly stained and a deeply stained film.

In this connection we cannot do better than to quote a passage from Wenyon (1926, p. 948). He writes as follows:—

"It has to be remembered that the malaria parasites are almost invariably studied in dried films stained by the Romanowsky stains. In many respects these stains, though giving very beautiful pictures, are very unreliable for they are subject to variations, which cause them to stain differently at different times. Thus, in the case of typical P. vivax, the absence of Schuffner's dots, which is sometimes noted, is almost invariably due to a poorly acting stain. The intensity of staining, depending on the quality of the stain, or the length of time it has been allowed to act, produces remarkable variations in the appearance of the parasites. When films are deeply stained, many more granules take a red coloration than when they are lightly stained, and it is certainly incorrect to regard all red-staining granules as chromatin. It has accordingly happened that new species of human malaria parasites have been described from time to time. Generally these have been seen in a single or in very few blood films taken from a case on one or two occasions. It has been impossible to follow the cycle of the parasite as has been done in the case of the three well-established species. Until this has been done, and the parasite has been proved to retain its characters, both in human and mosquito passages, it is quite unjustifiable to introduce specific names. Laveran (1914)
remarked that he had long held that the descriptions which were usually given of the species of malaria parasites were too schematic, and that in practice intermediate and veritable transition forms were frequently met with. This remark is certainly correct, and if every slight variation from the normal is considered of specific importance, there is no limit to the number of species which might be created."

The use of thick blood films

Of recent years we have come to rely more and more on the study of thick blood films in the diagnosis of malaria. This experience seems to have also been that of other workers. Thus diagnosis by thick films only appears to be the custom in all Divisions of the United Fruit Co., in Central America.

Whilst we fully agree with Sinton as to the very great value of the thick film, yet we consider that it is sometimes difficult to make certain of the diagnosis of species in thick film preparations. The very young rings of all three species are not easy to diagnose from one another in thick films, although more mature forms and gametocytes are usually easy enough to diagnose. In a recent case where examination of both thin and thick films had shown only *P. falciparum* present, culture showed the simultaneous presence of both *P. falciparum* and scanty *P. vivax* infections.

Conclusions

1. The distribution of malaria in general throughout the world is limited by the summer mean isotherms of 60°F.

2. The distribution of *P. falciparum* throughout the world is limited by the summer mean isotherms of 70°F.

3. It is shown that in Australia the malaria parasites appear to have only recently gained a footing and to still retain their northern hemisphere rhythm. They may be expected to extend their distribution over this continent unless artificially checked.

4. The distribution of *P. malariae* throughout the world suggests that this is a dying species with existing foci at the Burma-Yunnan frontier, the relics of Gondwana-land, and the Caucasus.
5. (a) The relative proportion of the three species within the area bounded by the 70°F. summer isotherm should theoretically be *P. vivax* 39 per cent, *P. malariae* 18 per cent, and *P. falciparum* 43 per cent.

(b) The actual proportions are very different, being *P. vivax* 43 per cent, *P. malariae* 8 per cent, and *P. falciparum* 49 per cent.

(c) From this it is concluded that the factors governing the relative distribution of the three species are not yet at all understood.

6. The parasite findings in armies both in peace and war may be expected to differ from those in the civilian population of the territory in which they are operating.

7. Mixed infections constitute about 3.7 per cent of the general malaria of the world and are distributed as follows:— *P. vivax* plus *P. malariae* 9 per cent; *P. vivax* plus *P. falciparum* 79 per cent; *P. malariae* plus *P. falciparum* 10 per cent; *P. vivax* plus *P. malariae* plus *P. falciparum* 2 per cent.

8. The relative gametocyte output of the three species is for *P. vivax* 21 per cent; *P. malariae* 45 per cent; *P. falciparum* 19 per cent. Great variations are found especially in the case of *P. falciparum*.

9. The conclusion of Sinton (1927) that the maximum output of gametocytes by *P. falciparum* occurs after the close of the transmission season is confirmed by our own findings as well as by results from other parts of the world.

10. A preliminary study of untreated cases of malaria by enumerative and cultural methods leads us to believe that usually malignant tertian malaria does not persist in an individual in the absence of repeated fresh injections of sporozoites.

11. Crescent development is not associated (in culture) with an increase in the acidity of the environment.

12. Growth and development of both schizonts and gametocytes of all three species in culture is inhibited below a pH of 6.0.

13. Methyl alcohol as a fixative for subsequent staining by Giemsa’s stain cannot be trusted after five days from the opening of the ampoule in the moist tropics.
14. Given a competent observer, examination of 100 fields of a thin film plus a reasonably careful examination of one thick film will enable a positive diagnosis to be made in 95 per cent of all cases of developed malaria; but will only discover 67 per cent of the cases of mixed infection.

15. However highly trained the observer our experiments show that it is utterly impossible to make a species diagnosis from the examination of a single ring-trophozoite form.

16. Our experience shows that a 95 per cent agreement in diagnosis can be expected from five minutes' examination of a thin film by recognized experts. With post-graduate students of the 'brigade or divisional laboratory standard' a 75 per cent agreement was reached with the same procedure.

From this we infer that the data used in Section I of this Memoir can generally be accepted as representing the actual facts as at present known with regard to the distribution of malaria species throughout the world.

17. Despite the length of this Memoir our final conclusion is that our present-day knowledge of malaria is remarkably meagre.
Clinical Notes

INJECTION TREATMENT OF HYDROCELE

D. M. BLACK, Lungchingtsun, Kirin.

In the British Medical Journal for Feb. 8, 1930 (page 239) F. C. Pybus reported on five cases of hydrocele treated by the injection of quinine and urethane, all of which had been free from recurrence for a period of one year or more.

Shortly after reading his report I happened to have a series of several cases and am reporting them in case the information may be of interest to any who missed the original report.

Case No. 1. Korean, male, age 6. Right hydrocele as large as two eggs and very tense. Present for several years. Tapped and 2 c.cm. of quinine urethane solution injected. Two months later the patient's father reported that the swelling had recurred within a few days but then had gradually decreased in size until it was about one quarter of its original size, much softer and appeared to be still decreasing in size.

Case No. 2. Korean, male, age 31. Left hydrocele the size of two fists. Present for three years and previously tapped twice. Tapped and 2 c.cm. of quinine urethane solution injected. After aspiration a fair sized varicocele was also found to be present. The patient was seen two weeks and four weeks later respectively, when only comparatively small amounts of fluid were present. Aspiration was done on these two occasions as the patient was of a neurotic type and practically insisted that this be done.

Case No. 3. Russian, male, age 50. Right hydrocele containing about 50 c.cm. of fluid. Right scrotum had been larger than left for sixteen years. Increase had been more rapid for past six months. Aspirated and 2 c.cm quinine urethane solution injected. One month later on examination not the slightest trace of fluid could be made out.
Clinical Notes

Case No. 4. Korean, male, age 1 month. This child was seen at birth when the right scrotum was enlarged and soft. One month later the swelling had doubled in size and was as large as two golf balls. Aspiration was performed. One week later the swelling had returned to its former size but was softer. Aspiration was repeated and 1 c.cm. of quinine urethane solution injected. One month later there was still a very small amount of fluid present but the mother reported that the decrease in size had been steady after the initial distension following injection.

Case No. 5. A fifth case was injected but no follow up record is available.

TECHNIQUE

In all these cases the sac was punctured by a medium sized needle after very superficial infiltration with novococaine solution. The fluid was expressed by pressure. A 2 c.cm. syringe filled with quinine urethane solution was then attached to the needle and the injection made through it. The patients complained of a slight burning sensation for a few minutes following injection. The solution was massaged around to spread it over the sac. Parke, Davis & Co.'s Quinine Hydrochloride and Urethane Solution in 2 c.cm. ampoules, prepared for the injection of varicose veins, was the product employed.

COMMENTS

This method of treating hydrocele is simple, painless, cheap and apparently effective. Though this series does not include any longstanding thick-walled hydroceles which had received repeated tapping, Pybus recommends it highly for such cases. It is certainly a boon in the case of children.
CUTANEOUS AMAEBIASIS RESULTING FROM A RUPTURED LIVER ABSCESS COINCIDENT WITH KALA-AZAR

Report of A Case

CHANG CHI CH'ENG, M.B.
Temple Hill Hospital, Chefoo.

History:—Male adult of 25, farmer by occupation, a native of Hai-yang Hsien, Shantung, was admitted to the Temple Hill Hospital, Chefoo, on Nov. 3rd, 1930. Complained of a big ulcerative lesion on right side of abdomen of 5 months duration.

Present Illness—dated back 6 months ago when patient noticed gradual onset of irregular fever associated with frequent mild attacks of epistaxis, and a mass, which gradually increased in size, in the left side of abdomen. Five months ago he had pain in the right hypochondrium. Ten days later a firm mass projected out from the same place. Native plasters were applied, which gave him no relief. The mass gradually became softened and in two months time, spontaneous rupture took place. Much foul, thick coffee coloured fluid escaped from the wound. Since then the fever was noticed to be less marked, and the mass in the left abdomen, which, by that time almost reached the umbilicus, also gradually reduced in size. However, the ruptured mass on the right side did not heal, but an ulcerative lesion, which kept on spreading in various directions and tended to give more and more discharge, was formed. It was for this reason that patient came in for treatment.

Past History—Productive cough 2 years ago, no hemoptysis. Diarrhea for several months last year, but no mucopus or bloody stools. No history of typhoid or malaria. Venereal exposures and diseases denied.

Examination—Normal development, poorly nourished.

Expression, sick. Skin, pale. Temperature 100°F.

Pulse 144 and respiration 24.
Clinical Notes

Chest—Lungs beside slight rapid respiration no abnormal findings.

Heart no enlargement, systolic murmurs over apex not transmitted. Tachycardia. Beats, weak.

Abdomen—A big discharging ulcer just below the right costal margin measuring $14 \times 16$ cm. in size. The edge was firm, elevated, and everted. The base was covered with brownish discharge and pieces of necrotic tissue, and after removal a fistula in the bottom leading upward and inward measuring $12$ cm. in depth was revealed. Other parts of the abdomen were soft and not tender. The spleen was $3$ cm. below left costal margin at nipple line. The liver, on account of the rigid thick ulcer edges was not satisfactorily outlined.

Laboratory Data—Blood: Hgb. $32\%$, W. B. C. $5,400-6,000$. Globulin precipitation test, strongly positive. Smear from splenic pulp showed heavy infection by Leishman-Donovan bodies. Discharge from the ulcer was positive both for motile forms of E. histolytica and Leishman-Donovan bodies. Stools yellow, soft, no blood nor mucus, and repeatedly negative for cysts or motile forms of E. histolytica. Sputum, no tubercle bacilli.

Treatment—The wound was treated with eusol irrigations 3 times a day, until it was clean. Hypodermic injections of Emetine $0.03$ gm. were given twice a day for 16 doses. Yatren, in $0.3$ gm. doses was given 3 times a day to a total dose of $6$ gm. Kala-azar treatment was carried on by Dr. C. H. Liu, by giving “Neostam” intravenous injections every other day to a total dose of $2$ gm.

The wound was clean and covered with fresh granulation tissue on the 8th day of admission, when the temperature was also down, appetite much improved. Body weight, gained $1.6$ kg. by the 25th day, when the patient was suddenly seized by an attack of pneumonic symptoms. Later the administration of neostam was resumed.
On the 36th day the granulating surface filled up the original gap. Skin graft was done on the 39th day. On the 48th day all the wound healed up nicely. The spleen was no more palpable. Patient was discharged on Dec. 21st, 1930 in excellent condition.

**Conclusion**—There are various complications of Kala-azar, but so far, I have never seen or heard that liver abscess is one of them. In the above case, Kala-azar coinciding with liver abscess, and at the same time, the abscess rupturing through the abdominal wall to the outside, and causing cutaneous amaebiasis, is certainly a rare condition.
Editorials

MALARIA

We consider it just as erroneous to treat a case of malaria without finding out the causative species, as to treat a case of dysentery without finding out which of the several causative organisms of this disease is responsible.

A recent issue of the Indian Medical Research Memoirs (No. 18) is devoted to studies in the parasitology of malaria and is the most important contribution to the subject that has appeared for many years. The memoir is an intensive study covering no fewer than 436 pages and in the work involved in preparing this volume the authors have searched thirty five of the more important journals dealing with tropical medicine for the years 1900-1928 and have written precis of approximately six hundred papers.

The work is divided into thirteen main sections dealing with parasitology, distribution, age, race, sex, occupation, technique, etc. From these we have selected a few extracts which we think will be of special interest to our readers and which we print in this issue, but the whole memoir deserves very careful study.

At the head of this editorial we have placed a quotation from this volume which should be pondered by all those working in malarial regions. We fear that it runs counter to a good deal of the practice in this country. It might however be made still stronger by including strictures on the treatment of cases as malaria without any sufficient evidence of the presence of the disease on the still too common assumption that a febrile attack in a malarial district is due to the plasmodium.

The remarks on China and our knowledge of the disease in our midst which the memoir contains are not flattering to the hospitals scattered through every province of this country and the time has come when a good many of our physicians ought to face this question with a determination to help the common cause by adding their quota to the sum of knowledge on this preeminently important subject.
Is it not possible to add to the value of hospital reports in 1931 by a more careful classification of the cases of malaria treated in the hospital routine?

SIR ANDREW BALFOUR, K.C.M.G.

The tragic death of Sir Andrew Balfour at the early age of fifty-seven has left a gap in the rank of workers in tropical medicine that it will be difficult to fill.

Educated at Edinburgh and Cambridge Universities, Balfour early devoted himself to public health work. He served in the South African War and on his return to England came under the influence of Sir Patrick Manson from whom he derived the interest in tropical medicine which was thereafter to become his life-work.

In 1902 Balfour was appointed director of the Wellcome Tropical Research Laboratory, and medical officer of health at Khartum and the remarkable work that he was able to accomplish in that city in transforming it into a model town as well as his enormous scientific output in the cause of tropical medicine soon brought him to the front rank of scientific workers.

In 1913 Balfour founded the Wellcome Bureau of Scientific Research in London and commenced the organisation of the Wellcome Museum of Medical Science. He served during the war in the Mediterranean area and later in East Africa.

For the last seven years his time and energy were given to the establishment of the London School of Hygiene and Tropical Medicine of which he was the director. He was particularly well suited for such a post and his appointment thereto met with very wide and hearty approval. In this work Balfour taxed his strength to the utmost and finally brought about a nervous breakdown from which it would seem he never fully recovered.

Outside the sphere of medicine Balfour won considerable distinction as a novelist and from his early days he was a sportsman, obtaining his “blue” at Cambridge and his international cap for Scotland in Rugby football.

In private life he was a man greatly beloved and his early demise leaves behind a host of mourning friends.
DR. JOHN ANDERSON

Elsewhere in this issue will be found a brief account of Dr. John Anderson's life. His early demise will cause a very serious gap in the ranks of those devoted to research work in China.

Dr. Anderson was a brilliant worker and a very able physician. In his position in charge of the Department of Medicine in the Henry Lester Institute in Shanghai he was looking forward to the fuller opportunity that this gave to him for research in the diseases of China. But in addition to his exceptional professional abilities he had a genius for friendship that is seldom equalled and his loss will be mourned by many friends the world over. To these and to the bereaved family we would extend our deepest sympathy.

A TREATMENT FOR INTESTINAL TUBERCULOSIS

We would call attention to a short paper on the treatment of intestinal tuberculosis by Dr. C. Frimodt-Moller from the December number of the Indian Medical Gazette which we reproduce in Current Medical Literature in this issue of the Journal.

The treatment of patients suffering from intestinal tuberculosis is so unsatisfactory in this country that we welcome any suggestions for its improvement. The suggestions here given are so simple and the apparent results so satisfactory that one naturally is inclined to wonder whether there is not a catch somewhere. Indeed we should have hesitated to give further publicity to this method if it had not been that Dr. Frimodt-Moller is so well known in India for his work on tuberculosis in that country.

If these results can be obtained there they ought to be obtainable in China also and we would urge that a trial be given to this method of treatment and the results reported for publication.
School and Hospital Reports

THE SCHOOL OF MEDICINE, SHANTUNG CHRISTIAN UNIVERSITY, 1929-1930

The report opens with a brief historical sketch followed by a description of the buildings and of their location. Thereafter is a report from the Dean of the School from which we note the following figures:— The Staff consists of 26 regular teachers and two head technicians. At the opening of the school year there were 88 students of whom 16 were women, and this year's graduating class was of 15 students of whom 3 were women.

The strike of the workmen during 1929 is referred to and we congratulate the School on its firm attitude thereto. As a result this semi-political move failed entirely, none of the demands were granted and the ring-leaders were dismissed. The difficulties that prevented registration of the School being effectuated last year are briefly dealt with.

Of special interest is a paragraph on the leper hospital from which we learn that 24 new cases were admitted in the course of the year and 25 were discharged. Up to the present 34 per cent of the cases discharged from the leper hospital have been clinically and bacteriologically free from the disease.

Needless to say the year was a difficult one financially owing especially to the unprecedented drop in the value of exchange.

The growth of the Staff which at the end of the year had increased to 29 is shown in a very interesting table, commencing with foreign staff 13 and Chinese staff 2 in 1918 and increasing to 16 foreign and 13 Chinese in 1930 with the prospect of a further rise in the number of Chinese staff to 17 this year.
This valuable report has now reached its twenty-second year of issue. In the past twelve months the inpatients have numbered slightly less than in the previous year and the outpatients are also somewhat down.

The bulk of the report is made up of separate statements from the different departments, all of which deserve attention. The increase in the number of autopsies, 171 instead of 75 is very noteworthy. The lack of autopsies is one of the most serious handicaps to medicine in China and it is to be hoped that this substantial increase marks the dawning of a better day.

The Medical Department reports the opening of an isolation pavilion to which 109 patients were admitted during the course of the year.

The Department of Obstetrics and Gynecology has been more than usually busy, the number of deliveries (486) being 20 per cent higher than in any previous year. Radium treatment has occupied a prominent position in the work.

The report of the Department of Pathology is, as usual, of special interest and the tables in it are of great value. They might however be further improved in some cases by the addition of a little more detail; for example in the table of helminths *Necator* might with advantage be distinguished from *Ancylostoma* and *Taenia* be resolved into its particular types. It is perhaps asking too much but it would be of considerable interest if racial and geographical information were given with regard to this last parasite. In view of the great rarity of *Taenia* in certain parts of China and its frequency on the other hand among some of the aboriginal peoples details of this kind would be of value.

In view of the notes on Malaria in this issue it is interesting to learn that *P. vivax*, *P. malariae* and *P. falciparum* have been met with in the proportion of 20: 1.3: 1.8.
Another point of interest in the report is the relative failure of liver puncture in kala-azar which does not harmonize with the findings in other areas in China. Some explanation of this should be forthcoming.

The report closes with the usual tables of classification of diseases and of operations.

JENKINS - ROBERTSON MEMORIAL HOSPITAL, SIANFU. B. M. S. 1930

Staff: Dr. Lees, Stockley, Tait. Nurses: 3 Foreign and one Chinese.
Beds, 100 Inpatients, 1023 Outpatient attendances, 23,985

We have received a brief type-written report of this very important hospital revealing the great difficulties that it has had to overcome in the course of the past year. As the only organised hospital in the province of Shensi we feel that a fuller and more formal report is eminently desirable. While recognising and because of, the immense handicaps, under which the hospital has worked and the devotion of the staff which has made this possible, we feel that this failure in efficient publicity is to be deplored and in the long run is a penny wise pound foolish policy.

In the midst of famine and political disturbances and hampered by strikes and serious illness of the staff the hospital has carried on a marvellous work as the figures given above will testify.

The opening sentence of the report is as revealing as any we have ever read of the difficulties that inland hospitals have had to meet of recent years.

"The year 1930 has in many ways been a very difficult one. The continuance of the famine, the war, bad communications, internal unrest and a certain amount of semi-official opposition all produced their peculiar difficulties, giving rise to a situation unparalleled in the history of the hospital."

To these difficulties have to be added a severe epidemic of typhus attacking Chinese and foreigners alike and the great difficulty and expense of obtaining medical stores in view of the disturbed conditions.

Despite all this the hospital is to be warmly congratulated on making marked progress especially as regards the re-organisation of the pathological department under an assistant trained by the I. H. T. in Hankow. But it is very pitiable to read as a sequel to the wonderful service rendered by the hospital that “surgical work has had to be somewhat curtailed owing to malicious criticism in various quarters.”

The absence of any professional report or tables of diseases is a serious lack. Valuable information about famine diseases and material that would be helpful to others so placed ought to be forthcoming from some of our doctors who have had special experience of such conditions and nothing along these lines has so far appeared from any hospital in the famine regions.

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MATILDA HOSPITAL, HONGKONG, 1930

Medical Superintendent: Dr. J. H. Montgomery

Beds 50  Inpatients 325

Owing to the absence of the medical superintendent for part of the year on a special study trip the number of patients admitted is slightly lower than during the previous year. Except for 1929, however, they are the highest on record, and this is actually the case as regards maternity patients.

Among additions in the course of the year is a new operating table built to his order of which the medical superintendent is justly proud. It is probably the finest thing of its kind in the Far East. In addition to possessing all the latest conveniences of movements and fittings it is made of stainless steel and is chromium plated.
Radium treatment is quite a feature of the work of the hospital and was recently reported on in these pages. The enjoyment of "wireless" is now available to all the patients.

The report has some excellent photographs,—the reproduction of which is hardly a credit to the printers.

McCORMICK HOSPITAL, CHIENGMAI, SIAM
A. P. N. 1929 - 1930

Medical Superintendent: Dr. E. C. Cort
Inpatients 1263 Outpatient attendances 4,918

The outstanding events of the year are the opening of a new hospital building,—a memorial to the reigning house of Siam,—and the gathering of a fund for an X-ray instalment.

Much of the work of the hospital (46 per cent) has to be free, owing to the depressed economic conditions of the patients, but the generous help it has received has ensured a substantial balance in hand at the close of the year.

A report of the laboratory and statistics of the medical, surgical and obstetrical services close the report which is well illustrated.
A NEW AND SIMPLE TREATMENT FOR INTESTINAL TUBERCULOSIS, INTRODUCED BY M. McCONKEY

By C. FRIMOND-MOLLER, M.B., Ch.B. (Copenhagen), Medical Superintendent, Union Mission Tuberculosis Sanatorium, Arogyavaram, South India.

During the last four months we have tried in the Sanatorium at Arogyavaram, near Madanapalle, a new method in the treatment of patients suffering from the complication of intestinal tuberculosis. We have carried out this treatment in 25 cases. This number would, of course, be all too small by itself for the forming of a definite opinion based on our own work only, but McConkey, of the New York State Hospital for Incipient Pulmonary Tuberculosis, has made a very thorough investigation into the merits of this treatment and published his findings only after three years of careful research. The results we have so far experienced have so strikingly confirmed McConkey's results that I think it only right that doctors in India should have an opportunity of trying out a treatment so simple that every practitioner can use it and can bring, in many cases, much relief to patients suffering from all the distressing symptoms of intestinal tuberculosis.

The treatment as described by McConkey consists of placing in a small tumbler three ounces of strained tomato juice or the juice squeezed from an ordinary-sized orange. On the surface of the juice is floated half of an ounce of ordinary cod-liver oil. The whole is served immediately after meals three times daily.

When it was demonstrated that artificial heliotherapy is of value in the treatment of intestinal tuberculosis McConkey began to think that cod-liver oil might be of equal value, especially as ultraviolet radiation and cod-liver oil are equally effective in the treatment of rickets and practically interchangeable as antirachitic remedies. He began therefore to give cod-liver oil to patients suffering from intestinal tuberculosis, but was disappointed as he was not able to observe any improvement by its
administration. While trying the effect of cod-liver oil, certain very sick patients were given orange juice with their oil in an effort to make the dose more palatable, and it was observed that these patients did better than those less seriously ill who were receiving cod-liver oil without the orange juice. Acting on this hint orange juice, and later the cheaper, but equally efficacious tomato juice, was added to the cod-liver oil in the routine treatment.

Very careful research work was then inaugurated and carried on for three years: 128 patients suffering from intestinal tuberculosis complicating disease of the lungs were observed: 28 patients, who had entered the hospital before the value of ultraviolet radiation was appreciated and who had received only ordinary palliative treatment, served as a control. Fifty patients were given ultraviolet radiation and 50 similar cases received cod-liver oil and tomato juice.

There was no outstanding difference in the severity or in the general condition of the patients in the three groups at the time they entered the hospital. The pulmonary lesion was either in the moderately advanced or in the advanced stage; cavities were present in 90 per cent. of the cases, and tubercle bacilli were found in the sputum of all but two. The diagnosis of intestinal tuberculosis was in all cases supported by positive radiographic findings.

It would carry us too far here to record all the different findings of this research. It is sufficient to mention the condition of the 128 patients at the time of writing. Of the 28 control cases 71 per cent. were dead and 14.5 per cent. alive (14.5 per cent. could not be traced). Of the 50 patients who received artificial heliotherapy, 24 per cent. were dead and 42 per cent. alive (34 per cent. untraced). Of the 50 patients treated with cod-liver oil and tomato juice 10 per cent. were dead and 86 per cent. alive (4 per cent. untraced).

The improvement in the condition of the patients began within a few days or weeks. The patients gained steadily in weight and more rapidly than those treated with ultraviolet radiation; the intestinal symptoms usually disappeared promptly and completely, and the gastro-intestinal tract became normal on radiographic examination.
It should be pointed out that the patients often complain, as we have also observed in our cases, of slight gaseous eructations savouring of cod-liver oil for the first week or so.

McConkey has not observed any contra-indications as he has not so far seen any gastro-intestinal tract becoming worse after the treatment. He continues the treatment for several months to a year after the tract becomes radiographically normal, or for a similar period after all intestinal symptoms have disappeared.

In closing, one deviation from the method described by McConkey must be mentioned. He lays great stress on serving the cod-liver oil and juice ice-cold, but owing to the difficult of getting ice we have been unable to do this. When using absolutely fresh orange or tomato juice, before there is any possibility of fermentation, the serving of the oil and juice ice-cold would seem unnecessary. We have had the most encouraging results in spite of this deviation from the original method.

*Indian Medical Gazette, December 1930.*

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**THE DIFFERENTIAL DIAGNOSIS OF CHOLERA AND FOOD POISONING**

**J. W. Tomb**

As fatal cases of cholera occurring amongst Europeans in India are often attributed to “ptomaine poisoning” it will be profitable to consider the differential diagnosis of these two apparently similar conditions. The term “food poisoning” or preferably “food infection” should be substituted for “ptomaine poisoning,” since it is food infected with certain pathogenic organisms which gives rise to outbreaks of so-called food poisoning. These organisms which have been bacteriologically verified belong to the Salmonella group of bacteria and include the *B. enteritidis* of Gaertner and *B. aertrycke*. The latter is very closely related to *B. paratyphosus B* and can only be
differentiated by the absorption test. The differential diagnosis of cholera and food poisoning by bacteriological investigation being out of the question in most cases in India, it is as well to consider the clinical symptoms in detail. The great majority of cholera cases begin with an attack of painless diarrhoea, one of the outstanding characteristics being the absence of pain, whereas in food poisoning there is generally acute abdominal pain. Again, the vomiting in cholera is unaccompanied by nausea, retching or distress, while the vomiting in food poisoning is often violent and distressing and is followed by diarrhoea. Suppression of urine never occurs, although it is complete in cholera. The mortality in cholera is very high, being about 90 per cent. in untreated cases, whereas it is very low in food poisoning, ranging from 1 to 2 per cent.

*Journal of Tropical Medicine and Hygiene, January 1931.*

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**TREATMENT OF OCULAR DISEASES WITH MERCUROCHROME**

E. R. Chambers, F.R.C.S.Ed., D.O.M.S.,
Ophthalmic Surgeon, Bristol Royal Infirmary.

Few medical men seem to realize what a useful drug we have in mercurochrome for certain ocular diseases. It is no new drug, having been used in Bristol for the last four years, so that a vast number of cases have been treated with it. My attention was first drawn to it by the fact that my surgical colleagues had proved it to be a useful antiseptic in bladder cases, and had found it practically non-irritating. In our hands, in the treatment of certain eye diseases, it has proved to be a very powerful antiseptic, and the irritation caused by it in the majority of cases is negligible. Its one disadvantage is its red colour, as this will stain the skin for a few days, but this can be obviated if, immediately after its application to the eye, any remaining on the skin is wiped off with moist cotton-wool. It is used in
the form of drops made of a 1 per cent. solution, as an ointment of the same strength, or as a paint of a 1 or 2 per cent. strength.

**USES IN CONJUNCTIVITIS**

The drug is of service in all types, and by far the best method of treatment is to paint both lids at once with a 1 or 2 per cent. solution, depending on the severity of the attack. In a case seen early, this treatment is invaluable for cutting short the duration of the attack, and there is no doubt that the instillation of drops, apart from the painting of the lids, loses much valuable time. For some time it has been my practice to paint these cases directly they come to me, and the results have been superior to those of any other type of treatment. The best way to apply the solution as a paint is to use a fine probe, such as that employed for the nasal duct, and, after winding a very thin piece of cotton-wool round one end, dip it into a receptacle holding perhaps ten drops of the solution; this prevents undue saturation of the cotton-wool, and if the painting is done carefully none need get on to the patient's lids. Apart from the acute cases of conjunctivitis, painting with a 2 per cent. mercurochrome is invaluable in those chronic cases in which there is a good deal of velvety thickening of the conjunctiva. This is the type of case that is so often beneficially treated with silver nitrate, or one of the silver compounds, but we have found mercurochrome superior to silver in that its irritation is considerably less (therefore it can be applied at more frequent intervals), that it cannot damage the cornea, and that there is no danger of staining the conjunctiva even if the drug be used over a very long period. It is our practice to treat this type of case with two paintings a week, and, if this does not suffice, 1 per cent. mercurochrome drops are given to the patient to be instilled twice a day, but of late we have come to rely more and more on the painting and to discard the drops where possible, as they are certainly "messy" when used by any patient who is not careful. We believe that every type of conjunctivitis is benefited by so painting the conjunctiva; for instance, two cases of severe Parinaud's conjunctivitis, with involvement of the cervical glands, cleared up, without any surgical intervention to the glands by this treatment. A case of tuberculosis of the conjunctiva did excellently with this treatment combined with
ultraviolet light. For the last four years the maternity department of the Bristol Royal Infirmary has issued a 1 per cent. solution of mercurochrome instead of the usual silver nitrate for instillation into the eyes of newborn babies. There has been a definite decrease in the cases of ophthalmia neonatorum, and now we never see those many red eyes that can be produced by silver nitrate. The only exception to our routine is if the parents are known to be infected with gonorrhoea, when silver nitrate is still used. All cases of ophthalmia neonatorum are now treated in the initial stages with mercurochrome drops; this drug, being non-irritating, can be used without fear of damage even if there be intense chemosis and swelling of the lids. In a case progressing favourably, mercurochrome painting of the lids in the later stages is also very beneficial, but in the more severe type of case one should still rely on silver nitrate in preference to mercurochrome.

**Corneal Affections**

Ulcers of the cornea if seen early can, with benefit, be painted with mercurochrome, but too much reliance must not be placed on this drug to the exclusion of more energetic types of treatment. Large phlyctenulae, or the small miliary variety, at the margin of the cornea often improve considerably with mercurochrome paint. Following serious or trivial injuries to the cornea, a drop of mercurochrome into the conjunctival sac is as good an antiseptic as any.

**Blepharitis**

This can be considerably benefited by the painting of the lids with a 2 per cent. solution. Before applying it all the scabs should, where possible, be removed. We use for this purpose a solution of warm sodium bicarbonate solution, applied gently with cotton-wool, so that the underlying tissues are not damaged. The edges of the lids are then thoroughly painted. The results, as compared with similar treatment with such solutions of brilliant green and iodine, show mercurochrome to be equally good, and, being so easy to apply and non-irritating to the conjunctiva, we now only use it for this condition. I have said that mercurochrome is non-irritating, but there is apparently an exceptionally rare idiosyncrasy to the drug. I have seen the occurrence only twice over a period of four years. In one, a
patient suffered from oedematous lids, face, and, later, chest and body. He was seen by a dermatologist, who considered mercuriochrome to be the cause. He rapidly recovered on cessation of the drug. The other patient had a considerable swelling of both eyelids of the treated eye, with a thin serous discharge, a condition very similar to atropine irritation. This cleared up rapidly on giving up the mercuriochrome.

**Mercuriochrome in Ophthalmic Surgery**

As a preliminary to all eye operations, a 1 per cent. solution of mercuriochrome is painted over the skin of eyelids and face after the part has been thoroughly cleansed in the usual way. Bacteriological investigations have shown this method to be as efficacious as painting with iodine, and no skin irritation is produced as with iodine, this fact being of some importance in eye surgery as the patient is less likely to interfere with the dressings. Before operations the conjunctiva is sterilized by instilling 1 per cent. drops of mercuriochrome two or three times on the day before the operation, and once in the hour before the operation.

With the experience of mercuriochrome over the period mentioned above, we feel justified in asserting that it is really of considerable value in ophthalmology.

*B. M. J., December 13, 1930.*

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**TREATMENT OF PERNICIOUS ANAEMIA WITH HOG’S STOMACH**

Report of 108 Cases


Director of the Laboratory for Clinical Investigations and Research, Manchester Royal Infirmary

**SUMMARY**

1. The earlier observations upon the value of hog’s stomach have been extended to 108 cases of pernicious anaemia, and the results are here discussed.
2. Treatment has been described using fresh and desiccated preparations of hog's stomach tissues. The dose and administration have been indicated.

3. After periods of observation up to eighteen months no relapses have occurred, and all the cases have done well.

4. This new form of treatment for pernicious anaemia with active preparations of hog's stomach has given highly satisfactory results—undoubtedly better than with liver, while the relative effective dose is less than the liver dose.

5. More than 92 per cent. of the patients treated with hog's stomach are perfectly well, and the majority are doing their full time work. A further 6 per cent. are much improved, but still suffer from varying degrees of nervous impairment.

6. Hog's stomach therapy is superior to liver diet in the speed of remission of the condition, the erythrocytes and haemoglobin increasing 157 per cent. and 94 per cent. respectively, compared with 90 per cent. and 77 per cent. respectively with liver under comparable conditions.

7. Hog's stomach therapy has qualitative effects on the blood picture similar to those of liver, but the erythrocytes and haemoglobin increase in a characteristic step-like manner in many cases. The colour index varies inversely with the red cell count.

8. Eosinophilia is frequently seen, but not in every case.

9. Clinically, the immediate results are similar to those obtained with liver. They are more prompt and, ultimately, the normal health is reached more quickly; work is resumed sooner; and all the gastro-intestinal symptoms appear to be relieved. This is not always the case with liver treatment, hydrochloric acid and pepsin being frequently required in addition to relieve the indigestion, flatulence, and occasional sore tongue.

10. Achylia gastrica persists despite the treatment.

11. Hydrochloric acid and pepsin do not appear to be necessary for the relief of symptoms with this form of treatment.

12. There is a minimum dose of hog's stomach to maintain the normal health of each patient. Regular blood counts are essential for the control of this dose, owing to seasonal variations and the profound effects of even minor infections.
13. Hog’s stomach in normal doses readily produces an excessive erythrocytic response, approaching polycythaemia, and several cases with counts over 6 million are now under observation.

14. Fresh hog’s stomach can be taken in adequate doses for a few days every three to four weeks with a maintenance of normal health.

15. Several cases with early postero-lateral involvement of the spinal cord have shown remarkable improvement, and paraesthesiae of hands and feet (without alteration of reflexes) have been almost completely cured in nearly every case. These have always been the symptoms most resistant to treatment.

_B. M. J., January 17, 1931._

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**AUTOTRANSFUSION**

The use of blood effused into the peritoneal cavity for autotransfusion was revived by Thies, of Leipsic, in 1914. It has the advantages of speed and simplicity, a donor and blood typing being eliminated. Mr. E. Dawson has reported two cases of ruptured ectopic gestation, occurring within a month, in which he adopted this measure. The patients were healthy women of 29 and each had a right interstitial tubal pregnancy. When seen they were extremely blanched; the radial pulse was absent, a small carotid pulse of 148 being palpable; respiration was 30 to 35, hurried and anxious. In neither case was any delay permissible.

Before opening the abdomen 300 c.c. of sterile citrate of soda solution were placed in an enamel jug of about one litre capacity. Into this was thrust, so as to form a bag, an abdominal swab of four thicknesses of well-washed surgical gauze, saturated with the citrate solution. The peritoneal sac was quickly opened, the incision elevated and escape of blood prevented. With an ordinary domestic tablespoon blood free from clots was rapidly removed and poured into the citrate solution, care being taken
that it all fell inside the gauze bag. When as much as possible was obtained, in each case about 150 c.c., the operation was rapidly completed, the tubes being carefully examined for signs of infection. The gauze bag was withdrawn from the citrated blood and its residue examined. A few tiny clots and globules of fat, escaped from the abdominal wall, were found. The citrated blood, measuring about 750 c.c., was then restored to the circulation through the median basilic vein by a funnel, tube and cannula. As the transfusion progressed the return of a pink tinge to cheeks and pinnae was spectacular and pulse and respiration improved.

Within 24 hours the pulse-rates were 100 to 108. The usual post-operative measures, such as the shock cradle, rectal injections of saline solution and glucose and pituitary extract were carried out. The recoveries were uneventful.

Mr. Dawson points out the special suitability of autotransfusion in the gravest type of case. It is in these that recent free blood is found in quantity. The less acute cases of ruptured ampullary gestation or of tubal abortion seldom afford sufficient unclotted blood for the purpose. Absence of any reaction or evidence of protein shock is also an advantage.

*The Clinical Journal, December 24, 1930.*

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**THE HAEMOSTATIC ACTION OF CONGO RED**

During the course of Wedekind's researches on carbon and Congo red in pulmonary tuberculosis, the haemostatic properties of the latter substance were accidentally discovered. T. Wedekind, J. Becker, and B. Wienert (*Münch. med. Woch.*, November 28th, 1930, p. 2049) have therefore explored the clinical use of Congo red as a haemostatic in various cases of haemorrhage. A sterile 10 per cent. solution of Congo red (Grübler) was used, 5 to 10 c.c.m. being injected intravenously, the injection being repeated if necessary; no untoward effects were ever observed although 50 conditions were treated.
including haemoptysis, bleeding from teeth sockets, menorrhagia, and haematuria, and in the great majority of these the haemorrhage was arrested in from half an hour to six hours. Foreign bodies, especially electro-negative colloidal suspensions, have been shown to be held up in the reticulo-endothelial system, and to cause there an increase of activity which shows itself by various changes in the chemical and physical composition of the circulating blood, including an increase of fibrinogen and blood platelets. This is probably the explanation of the haemostatic action of Congo red, since in most of the cases which did well the coagulation time was abnormally long before the injection, and was reduced to normal by the treatment, the platelet count increasing at the same time. This was particularly the case in haemoptysis from pulmonary tuberculosis, where a prolonged coagulation time appears to be a common finding.

B. M. J., January 24, 1931.

OSTEOMYELITIS TREATED BY THE “ORR” METHOD

I. E. Deibert (Annals of Surgery, December, 1930, p. 1087) reviews 100 cases of acute and chronic osteomyelitis and compound fractures treated by the “Orr” method; 37 were acute, 57 chronic, and 6 compound fractures. The age incidence was from 1 to 47 years, and every bone in the body was included in the series with the exception of the skull. It was found that the predominating organisms were the Staphylococcus aureus and albus with an occasional Streptococcus haemolyticus. Orr’s operative treatment consists in the making of a fairly large incision over the infected bone area and the spreading apart of the skin, muscles, fasciae, and periosteum to afford sufficient access. A window is chiselled into the diseased area to provide drainage; dead bone is removed, and the infected parts are cleaned gently with a curette. The wound is dried and wiped out with 10 per cent. tincture of iodine and then 95 per cent. alcohol; it is packed wide open with sterile paraffin gauze, and covered with a sterile pad and bandage. A plastic bandage or
splint is applied to immobilize the parts and keep them in a correct position. No dressing of the wound is undertaken for several weeks unless there are signs of acute sepsis or because of the odour. The average time for changing the plaster case and dressing was from three to five weeks. In the cases under review there were six deaths from acute osteomyelitis in children for whom treatment had been delayed, but in the remaining cases 75 per cent. of the patients are clinically well. It was found that the wound healed more quickly than by other methods of treatment, the bony defects were fewer, and the subsequent sequestration and secondary operations were lessened. The closed plaster bandage reduced the liability to secondary or mixed infection, and no case of ankylosis of adjacent joints was seen. It was found to be the type of treatment most comfortable for the patient.

_B. M. J., January 31, 1931._

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**AMIDOPYRIN IN THE TREATMENT OF MEASLES**

G. W. Ronaldson, M.D., D.P.H. and J. I. Collie, Ph.D., A.I.C., M.R.C.S.

We decided to treat as many patients as were available, and our series consists of unselected cases. The dosage adopted was 1 grain for each year of age, with a maximum of 5 grains. The drug was first given in the form of pyramidon crystals, but in the simultaneous treatment of a large number of patients, an aqueous solution containing 1 grain to the drachm was found to be more convenient, and less likely to give rise to nausea. Owing to its somewhat bitter taste, a few of our early patients who received the drug in powder form experienced slight nausea, but the liquid form was well tolerated, and no idiosyncrasy or any harmful effect was noted in any of the cases. The appropriate dose was administered four-hourly day and night until the temperature had settled. The treatment is comparatively cheap, the cost amounting to only a few pence per patient.
RESULTS OF TREATMENT

The results of the treatment were very encouraging, but the type of measles prevalent in London during the winter 1929-30 was milder than usual, and we are therefore chary of making claims which further investigation might show to be inapplicable to a more severe type of the disease. The best results were achieved in the earlier cases, but even in the later stages the treatment appeared to benefit a certain number of patients. Our experience agreed with that of Hoyne in the respect that the tendency to bronchopneumonia was lessened and complications were fewer. Some patients who were already suffering from bronchopneumonia on admission to hospital did well, but the drug did not seem to exert any influence on measles laryngitis or measles enteritis. In view of these observations, we could not substantiate the claim that the drug exercises a "specific" action.

In the majority of instances the temperature dropped to normal within twenty-four hours of the administration of the drug, and, though the precise therapeutic effect of a mere lowering of temperature may be a debatable point, a decided improvement in the patient's general condition accompanied the decline of the pyrexia. In a number of cases in which complications had supervened before treatment was initiated pyrexia continued, though on a lower level. Some writers have claimed that the use of amidopyrin in the prodromal stage will frequently exercise an abortive effect on the disease, and in one of our cases this effect certainly followed the giving of the drug; but we are well aware of the fact that a similar result in an untreated case would be by no means a phenomenal happening.

CONCLUSIONS

1. Amidopyrin is a valuable adjuvant in the treatment of measles.

2. Its action is chiefly antipyretic, but it appears to exercise some influence on the other symptoms of the disease.

3. Its value is greatest when given in the earlier stages, and in some instances it appears to modify the attack, but even in the later stages its use may be followed by good results.
4. From the results in our series of cases we are not yet in a position to give a definite pronouncement on the claim, made by certain writers, that the drug is a "specific" for measles.

5. The treatment is comparatively inexpensive, and very simple in its method of administration. In the dosage used by us it seems to be devoid of deleterious effects.

6. The use of amidopyrin merits further investigation over an extended series of cases.

B. M. J., December 13, 1930.

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TUBERCULOSIS IN HONG KONG

E. P. Minett, M.D., D.P.H., D.T.M. & H.
Government Bacteriologist, Lecturer in Hygiene, University of Hong Kong

Tuberculosis is at present the chief cause of death in Hong Kong. According to the returns of the Registrar of Births and Deaths, 2,537 persons died of tuberculosis in 1928. Pulmonary tuberculosis accounts for 11.75 per cent. of the total deaths, and non-pulmonary tuberculosis for another 5.5 per cent., making a total of 17.25 per cent. Bronchitis, broncho-pneumonia and pneumonia account for another 19.4 per cent. Assuming that a portion of these diseases is due to tuberculosis, it would, I think, be safe to put the total death rate at an even higher figure. Tubercular meningitis also, is by no means rare; 13.5 per cent. of my cases showed lesions in the brain.

On taking over work at the Victoria Mortuary, where the average daily number of postmortem examinations is twelve, I was immediately struck by the number of cases of tuberculosis, as was my predecessor, Dr. H. H. Scott (1921), who has recorded 300 cases. Another most striking fact is the rapid course it runs in small children, and I fully agree with Scott's view that the portal of entry is by means of the lungs. Of 4,837 postmortem examinations made by me in one year (1923), no fewer than 399 showed tuberculosis in some form. I have
collected and tabulated 200 cases covering a period of six months. The very large proportion of young children in the total, 33 per cent. under one year of age, and 54.5 per cent. under two years of age, is largely accounted for by the fact that a great number of young children, from infants of a few hours to children of one or two years, are left, ill, dying or dead, on the steps of the convent, either for adoption by the sisters, whose charity is well known, or to save the family the expense of death certificate and burial.

In discussing causation, I think we may safely exclude the alimentary form derived from tuberculous milk. I have examined many samples of milk from twenty-nine Chinese dairies, supplied to me by the Colonial Veterinary Surgeon, but in no case was *Bacillus tuberculosis* detected; in addition, Professor C. Y. Wang and I have frequently examined material from the intestinal form of tuberculosis in young children, in no case have we succeeded in isolating a *B. tuberculosis* of the bovine type; moreover, the Chinese do not as a rule use fresh milk in feeding young children. Chinese in Hong Kong do not seem to develop any degree of immunity in spite of the length of time that tuberculosis has been prevalent here.

Spitting is universal, and spittoons from restaurants and shops are emptied and washed into the street gutters. In many narrow streets, too, the effect of sunlight is wanting. It is of interest to note that De Silva (1925) found 3.8 per cent. of the gelatinous sputa found in public places in Colombo to be infected with *B. tuberculosis*. An investigation carried out here over a period of four months, on specimens of sputa in markets, railway stations and streets, showed the presence of an acid-fast organism, morphologically identical with *B. tuberculosis* in 7 per cent. of specimens collected from likely looking sputa. Melon seeds, a favourite article of diet, are dried on the street pavements. The strong sunlight of the tropics might be expected to exercise an adverse effect on *B. tuberculosis*, but this organism is more resistant to heat and drying than most non-sporing organisms, and narrow streets flanked with tall houses such as are common in our slum areas, do not get the direct sunlight. Zilgen (quoted by De Silva, 1925) is reported to have found dried tuberculous sputum infectious for animals when mixed with dust after exposure to sunlight for 140 days. One can see
clouds of dust blowing down some of our narrow, ill-ventilated streets, into the shops on the ground floor, inhabited by shopkeepers of poor physique with a chest development decidedly sub-normal, working long hours at close sedentary work. The result of this constant exposure to massed infection is obvious, and is shown in our high percentage of pulmonary lesions: 100 per cent. in our cases, of which 40 per cent. were pulmonary only. A similar condition is found in Sumatra, where Djamil (1928) states that more than half of those affected with tuberculosis are gold-smiths: were statistics available I am convinced that the majority of our cases would be found in the families of shop workers. As regards the incidence of tuberculosis in very young children, a total of 87.5 per cent. of our cases were under two years of age, and the fact that the lungs were affected in 100 per cent., and the intestines in addition in 45.5 per cent. of these children, undoubtedly points to infected dust, either inhaled or swallowed; or to swallowed sputum from the primary infection. An additional cause may be the habit that some Chinese mothers have, of first chewing food themselves before giving it to their babies.

November 25, 1930.

This is a second edition of a well known book, the first manual we believe on ante-natal care. The aims are fully expressed in the preface in the following sentences:

"Adequate ante-natal supervision is one of the two or three principal means by which alone we may reasonably hope to reduce the present mortality and morbidity of child-birth. The profession now realizes, and the general public are beginning to awake to the fact, that pregnancy has a more profound and far-reaching influence upon the whole of a woman's bodily processes than was formerly imagined, and that the physiological changes may easily and insidiously pass into the category of the pathological. Educated, watchful care is therefore necessary throughout.

I voice no idle dream, but on the contrary a perfectly practicable achievement—given an enlightened public opinion—when I say that the universal exercise of proper ante-natal care will enormously reduce the incidence of abortions and of still-births, will almost entirely reduce eclampsia, and will go a long way towards solving the problem of puerperal infection."

This little volume covers the ground of ante-natal care very fully but without redundancy and with a clarity that makes it an ideal text-book on this important subject. The guidance it gives is everywhere practical and practicable.

The first chapter on the Ante-natal clinic is particularly good as giving in a few sentences an adequate description of all that is needed in any ordinary clinic of this nature. It includes a plan of a simple but well arranged building for this purpose.

There follows a chapter on the diagnosis of pregnancy in which we think that the Authors are rather too cautious about the possibility of a certain diagnosis in the early months. Thereafter are chapters on the physiology and pathology of pregnancy, on other complications in pregnancy and on venereal disease. Finally there is a chapter on Post-natal care and one on Maternity and National Health Insurance Benefits in Great Britain.
The only minor criticism that we have to make is on the amount of importance that the Authors attribute to retro-version in the production of abortion. Our own experience of a number of cases of extreme and prolonged incarceration with the extraordinarily small proportion that terminated in abortion makes us sceptical of the influence of mere retroversion in producing this.

We commend this book most highly. It should be in the hands of every medical student and is eminently the text-book for every ante-natal clinic.

J. L. M.

ABDOMINO-PELVIC DIAGNOSIS IN WOMEN. By A. J. Walscheid, M.D. Published by The C. V. Mosby Company, St. Louis. Price $12.50.

This work is stated in the preface to be intended primarily for the post-graduate student and the general practitioner.

The writer has attempted to give the book an anthropologic substratum as an essential element in diagnosis. The result is a book of very special interest but the attempt to do this while at the same time abiding by the author’s statement that it is strictly limited to the diagnostic field can hardly be called a success, and it is difficult to see how these two aims could possibly be combined. Much material indeed in chapters on etiologic factors and general symptomatology as well as in other parts of the volume have no possible relation to Abdomino-Pelvic Diagnosis. In every way this book is a valuable one except in its title.

The subject matter is divided into Part I General Gynecology and Part II Special Gynecology. The first part covers anatomical considerations along the lines noted above; etiologic factors, general symptomatology and gynecologic examination and diagnosis. The second part deals with diseases of the various organs.

The book is well arranged and comprehensive in its description of the various pathological conditions and the addition of illustrative cases to many of the clinical description adds greatly to its value. The illustrations are numerous and excellent.

J. L. M.
THE INTRODUCTION AND SPREAD OF THE FISH TAPEWORM

(*Diphylobothrium latum*) IN THE UNITED STATES. De Lamar Lectures, 1929—1930. By HENRY B. WARD, Ph.D., Sc.D., Professor of Zoology, University of Illinois.

Professor Ward's little monograph on *Diphylobothrium latum* is of value alike to parasitologists and to those interested in public health. He traces the history of the infection in ancient times and of more modern date in Europe and then devotes his paper to the introduction of the parasite into the United States and its spread therein.

The account of the spread of the disease by means of infected immigrants is interesting and convincing yet it does not seem to us that the writer has quite successfully excluded the possibility of a native source of infection in some parts of the American continent especially where lakes near Indian reservations are most heavily infected.

In view of the fact that dogs and other animals quickly become carriers of the parasite it is difficult to see how the disease is to be eradicated especially in view of the extraordinarily prolific nature of the worm. Two calculations made by Lyon showed 825,000 ova in a solid stool and 2,100,000 in a liquid stool. Efficient cooking of all fish should however speedily remove the disease from the list of human infection.

J. L. M.


The medical profession in China is again indebted to Dr. Bernard Read for a new edition of this useful little book. It is especially valuable in view of the preparation of the first *Chinese Pharmacopoeia* and this has necessitated a complete revision of the former edition.

In his preface Dr. Read writes: "It has been thought necessary to retain or add the names of all drugs cited in the American, British, Japanese and German Pharmacopoeias, which are in common use throughout China. Unless indicated to the contrary this book summarizes the drugs listed in the Chinese Pharmacopoeia, however, until the latter is published it is difficult to guarantee the inclusion of everything cited therein."

The book opens with a list of plant principles and names, followed by tables of Materia Medica covering 656 drugs. These tables give in columns the Latin and Chinese names of the drug, dosage, chemical formula, effect and synonyms.
Further tables deal with reagents and test solutions, the medicinal preparations classified under the usual headings, a separate list of synonyms, solubility terms, a therapeutic index, volumetric test solutions, equivalent weights and measures and atomic weights of the chief elements. The book is bilingual throughout.

It will be seen that an enormous amount of essential information has thus been provided in quite small compass and Dr. Read is to be congratulated on this very valuable book. Its only lack is a table of contents at the beginning.

J. L. M.

BRIEF NOTICES

SOUVENIR CINCHONA TERCENTENARY CELEBRATION AND EXHIBITION at the Wellcome Historical Medical Museum, London.

We have received a handsome booklet giving a catalogue and details of this exhibition which was open in London from 8th December 1930 till the end of February 1931. The exhibition was planned to illustrate in outline the historical development from the time of the introduction of cinchona bark until the present day, and was made possible by the cordial assistance and willing cooperation of scientists and learned societies in various parts of the world.


Formerly appearing under the title of The Journal of Cancer Research this publication is now completely reorganised and the first number of the new journal is referred to here. Thanks to the generosity of Mr. Garvan and Mr. Buffum of the Chemical Foundation the editors are able to receive articles solely on their own inherent worth without regard to their length or the number of illustrations; and an abstract department is being organised to cover the entire field of cancer. This first number of the journal runs to 561 pages. It is evident that this is likely to become the authoritative publication on cancer.
HEALTH. A popular monthly Journal devoted to Topics of Health in Malaya. P. O. Box 270. Singapore. Annual subscription, Sg.$3.

In an introduction to the first number of this new popular monthly Dr. Hoops, P.M.O., Straits Settlements, writes:

"In future the strongest additional lever towards the improvement of Public Health must be the active and informed interest of the individual in the well-being of himself and of his fellows. For this reason I welcome the advent of "Health."

If this little paper can, in future issues, maintain the high standard of the first number it should do well. Excellent popular articles diagrammatically illustrated are to be found on Malaria and Harvest-mites and considerable space is given to Notes and Abstracts interestingly written on foods, physical exercise, preventive measures, common maladies, women, infants and school children.

We very heartily wish this new venture all success.
Obituaries


Dr. John Anderson was born at Galston in the county of Ayr, Scotland, in 1879. He was educated at Glasgow University and was in practice at Wallasey near Liverpool for some years before the war. Joining the R.A.M.C. (Territorial Force) in April 1915, he served mainly in Gallipoli and Palestine being mentioned in despatches in 1916; later he served as Bacteriologist and also as Pathologist in various military hospitals and laboratories and did not leave the army until June 1920. In the same year he took his M.D. Glasgow with high commendation.

Shortly after the war Dr. Anderson was awarded a fellowship at the School of Tropical Medicine in London and thereafter took a prominent part in tropical research. He served as a member of a commission to British Guiana for the study of filariasis under Professor Leiper completing the work of the expedition after the departure of Professor Leiper and publishing its report in the Research Memoir Series of the London School of Tropical Medicine in 1924. Dr. Anderson was the first full time Professor of Medicine of Hongkong University from 1925 to 1929, and was responsible for organising the department as a "medical unit."

In January 1929 Dr. Anderson was appointed to the staff of the Henry Lester Institute as head of the Division of Medicine and Tropical Medicine and spent that year in England in the preparation of plans for building and equipment of the Institute. He was, while in London, awarded the diploma of M.R.C.P. He came to Shanghai early in 1930.

Dr. Anderson was an usually able and enthusiastic worker and his loss to medicine in China is a serious one. Above all he was a man of a very genial and attractive character and his early demise leaves many friends to mourn him all over the world. He died after a short illness on 28th March, 1931, and at the request of his relatives his body has been sent home for burial in Scotland.

Dr. E. F. Parsons

Dr. Parsons died on March 8th at the P.U.M.C. from pneumonia, after a very short illness. He came to China in 1925, and after a year of language study was located at the Williams-Poiter Hospital, Tehchow. After two years of work he was relocated to Tunghsien, near Peiping, where he has been in charge of the hospital, and also has had medical supervision of the students in the North China American School, and in the Chinese schools there.

Dr. Parsons had shown himself interested in several phases of
scientific medicine, in which he gave every promise of being a leader. A few weeks before his early death he was making a tour of the hospitals of the North China Mission of the American Board, in his capacity as one of the medical representatives of a Survey Commission. While making this tour he contracted influenza, and returned to Tunghsien where pneumonia developed.

Dr. Parsons was versed and interested in psychiatry, in which he had special training.

On March 13th a triumphant memorial service was held, in which several friends from Peiping and other points took part. He could ill be spared from the ranks of consecrated Christian physicians in China.

Mrs. Parsons is a trained nurse, and there are three children.

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Chen Yuan Kok  M. D. (Peiping)  Lingnan University  Canton
Proposers:— Dr. Wm. W. Cadbury,
            Dr. A. C. Siddall.

Hsu Kang-Liang  M. D. (Shanghai)  Canton Hospital  Canton.
Proposers:— Dr. Wm. W. Cadbury,
            Dr. A. C. Siddall.
NEW MEMBERS ELECTED

Dr. C. H. Chang K. M. A. Tangshan, Hopei.
Dr. Wm. Courtney Douglass P. N. Siangtan, Hunan.
Dr. Ruth Earp, (Mrs. Douglass) P. N. Siangtan, Hunan.
Dr. Theodore V. Oltman R. C. A. Kualangsu, Amoy.
Dr. Kathleen A. Pih N. Z. P. M. Canton, Tung.
Dr. H. C. Li O. S. F. M. Kaiyuen, Man.