was flushed with hot salt solution, and gauze packing introduced around the stomach and in the wound.

Although the child was in a desperate condition at the beginning of the operation, all the manipulations were completed and the child placed in bed; but he sank steadily, and died from the shock.

From the direction taken by the paling, it is probable that the heart itself was badly contused by the point. At the autopsy it was found that the rent in the stomach and diaphragm had both been tightly closed by the sutures, and had not the shock of the accident been sufficient to kill the child, his chances for recovery would have been favorable. The left lung had collapsed.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, November 5, 1900.

The President, DE FOREST WILLARD, M.D., in the Chair.

INFECTION BY THE BACILLUS AËROGENES CAPSULATUS IN AN OPEN FRACTURE OF THE RADIUS AND ULNA.

DR. JOHN B. ROBERTS said that he desired to put on record a case of gangrene of the forearm after an open fracture, which appears to have been due to infection with the gas bacillus.

A young girl, aged twelve years, slipped and fell on August 31, 1900, sustaining a fracture of the left radius and ulna about the junction of the middle and lower thirds. One of the fragments of the ulna made a small wound through the skin. Dr. J. H. Hardcastle, who had charge of the case, cleansed the wound with soap and water and solution of corrosive chloride of mercury (1 to 1000), and dressed it with iodoform gauze and cotton. He says that there was a little dirt over the site of the wound when he first saw the patient, and that the bone did not protrude through the small opening, though he believed that the tear in the skin, which was perhaps a third of an inch long, was caused by the projection of the bone against the soft parts at the time of the injury.

When first seen by Dr. Roberts, on Friday, August 31, three days after the accident, the left hand was bluish black or slate color, and cold. A small wound of the skin existed on the palmar surface of the wrist over the lower part of the shaft of the ulna, perhaps one inch above the joint. It was a small puncture, and not gaping. The skin around this opening was blue and darker than the rest of the skin of the wrist or hand. The discoloration extended up nearly to the elbow, farther posteriorly than an-

teriorly. The arm was swollen and tense and crepitated on pressure. The arm above the elbow was swollen but not dark. The patient was etherized, and several long incisions were made from elbow to hand, through the skin and deep fascia, exposing bluish gangrenous muscles at places. Bleeding occurred from the upper part of the incisions, but not from the gangrenous areas in hand and forearm. The wound was dressed with wet mercuric chloride dressing. The patient had a temperature of 103.8° F., and albumen with casts in urine. She was clear-headed and did not complain of very much pain.

The next day he amputated about the middle of the upper arm, making first a circular incision about two inches below the elbow, hoping to save the joint and part of the forearm. This showed the disease in the deep muscles to extend higher than in the overlying skin. The tissues over the olecranon were blue, while in front the disease was not so high up. Finally, an irregular amputation was made by anteroposterior flaps above all gangrenous structures. The tissues left were, however, slightly crepitant. There was not much fluid in the tissues. He dissected the specimen along the radial and ulnar arteries near the injury, but found no rupture or laceration of vessels. The arteries seemed to have clot in them and were discolored. There was not much fluid and not a great deal of gas in the tissues. There was some gas, however, and a few blebs had shown themselves on the hand. The most active focus of death was near the small puncture, which suggested that infection had been caused by a gangrene-producing germ. Both bones were broken at the line of wound.

Two days after the operation urticaria was noticed upon the limbs and trunk. About half an inch of one of the flaps showed gangrene. An examination of the axilla showed no enlargement of the lymphatic nodes. The stitches were removed and the lips of the wound allowed to gap; and the arm was again dressed with solution of corrosive chloride of mercury, which had been used since the time of operation.

On the next day the patient spat about half a drachm of blood, which she thought came from her nose; but the temperature had fallen to about 100° F. The wound was the seat of a very offensive odor, and the gangrenous process in the flap had extended slightly. The dressing was changed to a solution of

1 per cent. formaldehyde. The urine still contained albumen. From this time the patient's condition rapidly improved. The foul odor was destroyed by the formaldehyde, the gangrenous process ceased, and the dead tissues became mummified. The albumen and granular casts disappeared from the urine, and the child was discharged from the hospital on the twentieth day after amputation, with, however, the wound not entirely healed.

The rapidity of the gangrenous process, the fact that the attending physician stated that the splint and dressings had not been applied unduly tight, the evident activity of the morbid condition around the site of the wound, and the crepitant condition of the limb above the seat of gangrene suggested that the unfortunate result of the fracture was due to infection with some gangrene-producing micro-organism. An examination of the amputated arm at the Pepper Laboratory was made by Dr. S. S. Kneass, who found the bacillus aërogenes capsulatus in the tissues. Dr. Hardcastle had recently informed the operator that at the time he dressed the wound and fracture, he was assisted by a girl who had been nursing a case of what was supposed to be erysipelas, the result of a wound of the arm from a meat-hook. Dr. Hardcastle did not know this at the time he accepted her as an assistant.

Dr. M. B. Miller said that, as far as he had been able to learn, this was the first case of infection by the bacillus aërogenes capsulatus recorded in Philadelphia or its vicinity. All the work on this bacillus in this country had been done in the neighborhood of the Johns Hopkins Hospital.

He had seen the patient with Dr. Roberts. There were two features about it which particularly impressed him,—one was the curious feeling of the gangrenous arm. The only thing that he could compare it to was the crepitant feeling of pulmonary tissue. The other feature that impressed him was that this gas formation was not only in the tissues themselves, but also involved the blood-vessels. Both in the radial and ulnar arteries the gas had formed in the form of long bubbles, with smaller areas of blood-clots in between, giving a beaded appearance that could be seen through the blood-vessel walls.

Dr. Henry R. Wharton said that he noticed in Dr. Roberts's case a similarity between the clinical symptoms presented and those of traumatic spreading gangrene that surgeons used to see formerly, but which is rarely seen at the present time. Certainly

there were a great many symptoms in common with the infection produced by the bacillus aërogenes capsulatus and the infection that was present in cases of spreading gangrene—traumatic spreading gangrene—which was often seen in compound fractures, the form of gangrene described by the French writers as "bronzed gangrene." He had never seen cases in which the presence of the bacillus aërogenes capsulatus was demonstrated, and yet, from the description of these cases, there is a similarity to the cases of spreading gangrene. He remembered a compound fracture of the forearm in which this form of gangrene developed in twenty-four hours and spread rapidly from the forearm up to the shoulder. In this case, by prompt amputation at the shoulder-joint, the patient's life was saved. He formerly saw a good many cases of spreading gangrene, not only in his own hospital experience, but in that of Professor Ashhurst, in which prompt amputation saved many lives.

Dr. J. B. Roberts rejoined that Dr. Miller had just reminded him that Dr. Kneass reported to him that he found a pure culture of the bacillus aërogenes capsulatus. It was not a mixed infection. He had seen spreading traumatic gangrene where there was a great devitalization of cells from the injury itself; and he had seen cases of spreading gangrene, not after such crushing injuries; but he did not recollect ever having seen gangrene spread with such great rapidity as here, unless there was something in the extent of the injury or in the damage to the vessels to cause it. There was here a little wound, an insignificant thing, yet in three days the girl's arm was gangrenous irregularly up to the elbow; the temperature was 103.8° F.; and albumen and tube-casts were present in the urine. He believed that what used to be called hospital gangrene would, under the present bacteriological methods, be found to be an infection of this bacillus, the bacillus of malignant œdema, or some similar organism. The so-called bronze gangrene he was not familiar with. He had never seen angina Ludovici, which is probably an infection with the bacillus of malignant œdema. Many of the old descriptive names for various forms of gangrene have fallen into disuse, because bacteriological investigation has enabled surgeons to discard them for more accurate designations founded on the bacterial character of the infections.

LEFT-SIDED APPENDICEAL ABSCESS.

Dr. Francis T. Stewart reported the case of a boy, aged nine and a half years, who entered the Pennsylvania Hospital, August 8, 1899, suffering with diarrhœa and slight fever. There was nothing in the family or previous history bearing on the case. Four days before, after eating candy and pop-corn, he began to vomit, and complained of abdominal uneasiness. The bowels readily responded to a laxative, the loose movements persisting. On admission the abdomen was slightly distended and the lower right quadrant tender. The walls, however, were flaccid, and no mass could be felt externally or by rectum. He was sent to the medical ward with a diagnosis of enteritis. At the end of two weeks the tenderness had disappeared, the abdomen had become flat, and some induration could be palpated between the umbilicus and the left anterior superior iliac spine. On the nineteenth day, the mass having increased considerably in size, an incision through the abdominal wall was made by Dr. Le Conte, and a large quantity of foul pus evacuated. The abscess cavity was trabeculated and completely shut off from the general peritoneal cavity by firm lymph. The appendix was not found, nor was it diligently searched for. Six weeks later the wound had practically closed.

Dr. Stewart said that this case might be regarded as one of enteritis, followed by appendicitis travelling from the base outward to the tip, which lay to the left of the mesial line; the suppuration being caused by a migration of the bacteria rather than by a perforation, as there was neither gas nor fecal concretion in the abscess cavity. The pus was thought to be appendiceal from its character; but that the infection originated primarily on the right side is probable, because of the situation of the initial tenderness, as there was no transposition of the viscera, and because of the rarity of left-sided appendicitis. Edebohls (*New York Medical Record,* November 25, 1899), who has made a very exhaustive study of the literature of appendicitis, says, "As regards left-sided appendicitis, the only genuine case thereof on record is that of Biegi (*Med. Moderne,* 1897, viii, p. 643), which occurred in a soldier who died of appendicitis, and was found on autopsy to have a complete transposition of all the viscera. The case of Bontecou (*Transactions of the Medical Society of New York,* Albany, 1873, lxvii, pp. 137-139), in which death resulted

from ulcerative perforation of the small intestine into the left iliac fossa; that of Traube (*Medical News,* 1893, lxiii, p. 604), of a perityphlitic abscess pointing on the left side; and the three cases reported by Fowler, in which the cæcum and appendix were displaced to the left, all originated primarily in the right iliac fossa. So did the case of Coates ("Manual of Pathology," 1895), in which empyema of the left chest followed perforation of the diaphragm from an abscess of appendicular origin."

APPENDICITIS COMPLICATED WITH LEFT-SIDED ABDOMINAL ABSCESS AND LEFT PYOTHORAX.

Dr. Stewart reported a second case, for which his thanks were due to Dr. Morton for the privilege of operating upon and reporting. A man, aged nineteen years, was admitted to the Pennsylvania Hospital, November 7, 1899, after having suffered five days with abdominal pain. There had been no chill, vomiting, or constipation. Nothing relevant in either the family or previous history could be ascertained, except that he had been struck a smart blow over the appendix several days before the onset of pain. He had had the opportunity to observe several patients who attributed their appendiceal trouble to injury. Small (*Medical Record,* September 10, 1898) reports thirteen cases of appendicitis with a clear history of trauma. The temperature was 100° F.; respirations, 28, and pulse, 100. Both recti were hard, the pain active, and tenderness most marked at McBurney's point. No mass could be felt and no dulness elicited, although, as was afterwards ascertained, the appendix lay just beneath the abdominal wall. An incision in the right semilunar line was immediately made, opening a large abscess which was completely isolated from the surrounding peritoneal cavity. The appendix measured three inches, pointed directly inward, the tip adhering to the parietal peritoneum just to the left of the midline, and the outer two-thirds was gangrenous. During enucleation the distal extremity was ruptured. There was no foreign body and no fæcal concretion. The abscess cavity was loosely filled with gauze. On the third day the temperature reached $101^1/_5°$, and thereafter varied between 99° and 102° until the second abscess was opened. On the ninth day he had a chill, the discharge which had been profuse became scanty, and a mass was detected in the lower left abdomen;

this was opened on the twelfth day, evacuating several ounces of foul pus. The patient was comfortable and the temperature normal for twenty-four hours, when, after feeling chilly, the temperature arose to 103°. As the discharge from the abdominal wounds decreased, the symptoms of sepsis increased. On the twentieth day there was another chill, followed by a temperature of 104°, and this by a profuse sweat. On the twenty-first he suddenly expectorated a large quantity of foul pus containing the bacillus coli communis, severe axillary pain followed, and at the end of twenty-four hours the expectoration had ceased, the left chest had become flat, and the heart had moved to the right. The pleural cavity was opened through the seventh interspace and a rubber tube inserted. From the foul brown liquid which escaped cultures of the colon bacillus were obtained. The temperature fell to normal and recovery seemed assured, when on the thirty-first day he began to complain of increasing abdominal pain. He became constipated, peristalsis could be seen above the wounds, and fever again appeared. It was feared that adhesions obstructed the fæcal current and that a fourth operation would become imperative, but the bowels were finally induced to move, and on the thirty-fifth day, four days after the onset of abdominal pain, he was again comfortable. He was discharged on the thirty-eighth day, with a small tube still in his chest and both abdominal wounds closed. Since leaving the hospital there have been several attacks of pain, with transient constipation.

A pronounced feature of this case was the rapidity of abscess formation and the remarkable recuperative power, both general and local, which was exhibited. The primary abscess promptly closed when the second was opened, which in turn rapidly healed when the pus migrated to the thorax; the pulmonary abscess discharged through the mouth only twenty-four hours, and sixteen days after the empyema was drained the patient was able to go home. And this, with the absence of joint, liver, and endocardial inflammation, would seem to indicate that the suppurative process extended by contiguity rather than by the blood channels, as in pyæmia. There were no symptoms of diaphragmatitis, and the abdominal abscess apparently did not extend as high as the abdominal dome.

In Edebohl's (*Ibidem*) article there are recorded nine cases of appendicitis with lung complications,—four of these were em-

pyemas, three perforation of the lung by abscess, one gangrene of the lung, and one pneumonia. Weber (*Deutsche Zeitschrift für Chirurgie,* February, 1900) reports nine cases of subphrenic abscess; in six of these right-sided pyothorax developed, and in one of these perforation of the diaphragm was found. Jeanmire (*Gazette Hebdomadaire de Médecine et de Chirurgie,* March 1, 1900) puts on record a case of appendiceal abscess opening into a bronchus and followed by recovery.

Dr. John B. Deaver said that he thought the report of these two cases to be very strong arguments in favor of early interference and against delay in operating upon appendicitis. He had seen cases similar to those described by Dr. Stewart time and time again. They are always late cases. This left-sided condition of the appendix is not an uncommon condition. He took the credit of first calling the attention of the profession to pain in the left side as indicative of a southerly position of the appendix. In these cases he always took the appendix out and had never made an incision on the left side of the abdomen. He did not think for one moment that this was originally a case of enteritis. It was appendicitis from the start.

In operating, he incised over the seat of the appendix, that is the normal position of the appendix, and worked his way down into the pelvis and removed the appendix, drained, etc. Although it is the practice of some physicians to tap them through the rectum, and, in a few cases in the female, through the vagina, this practice he highly disapproved of. These cases demonstrate the ravages of appendiceal pus. He had seen pus make inroads in cases where the physician in attendance did not recognize the condition. He had seen a number of cases where appendiceal abscesses had ruptured into the lungs, and by way of the bronchus escaped through the mouth. These are not very uncommon conditions in late cases. There is very much that can be said on the subject, but nothing against early interference, interference at the earliest possible moment.

FRACTURE OF THE FEMUR IN AN INFANT.

Dr. H. Augustus Wilson reported the case of a well-nourished infant of three months, who was brought to him with a marked fulness in the upper and inner part of the left thigh, which was palpably due to a bony mass just below the great trochanter.

Examination showed the enlargement of the thigh to be probably due to a mass of callus and malposition following a fracture, the fragments having united at an obtuse angle, the apex pointing forward. There was no demonstrable shortening, and it was inferred that no overlapping had taken place.

He availed himself of the presence in Philadelphia of Dr. H. M. Sherman, of San Francisco, who operated upon the patient on May 5, 1900, at the Philadelphia Hospital. Incision of the soft parts overlying the mass showed that the swelling was due chiefly to a very large mass of callus, and that there had been a fracture just below the great trochanter, and union had taken place, as surmised, with angular deformity, which was far less than external appearances indicated.

The exuberant callus was chiselled away, the fracture reproduced, and the fragments put in apposition in proper position. It was found impossible to make the delicate bone hold a silver-wire suture, and therefore maintenance of apposition was secured by splint. The wound was closed with catgut suture, a small sterile gauze drain being tucked into its middle, which was removed the next day without removing the outer gauze dressings.

The plaster-of-Paris splint included both legs and extended up to the chest, being in effect a double spica of the thighs and hips. The legs were moderately abducted and a light stick, reaching across from one foot to the other, was included in the bandage, and thereby increased stability.

During the application of this apparatus, Dr. Sherman devoted his especial attention to the position of the affected leg, to secure the best possible position of the fragments. Recovery was uninterrupted, and at the expiration of four weeks the original dressings were finally removed, and the result found to be perfect.

Dr. Wilson said that the question of causation of this fracture was of moment from the medico-legal stand-point, as the obstetric procedures at the child's birth were unusual. The delivery was accomplished by Dr. Edward P. Davis, who would state the difficulties encountered.

In the opinion of Dr. Sherman the history was one of a plain procedure with no serious complications. The only force applied to or transmitted through the femur was simple traction, slight leverage was used, or could have been used. Furthermore, the whole of the traction force did not act on the femur, for the mus-

cles between the tibia and the pelvis, both on the front and back of the thigh, must have taken some of it. It may be that, rarely, this procedure could cause a dislocation of the hip; but it is very unlikely, hip dislocations being much more easily accomplished if the thigh is flexed on the abdomen and then force applied to the knee, pushing the femoral head over the lower and hinder part of the rim of the acetabulum where it is low.

The clinical history after delivery showed no immediate disability, but one that developed a few days after birth. The inference is unavoidable that the fracture was either intrauterine or occurred after delivery. As no history of fall can be obtained, it would appear that the fracture was intrauterine, with slight manifestations which made it possible to overlook its existence at the casual examination made by Dr. Davis's instructions immediately after delivery.

Dr. Sherman had further called attention to the fact that obstetricians endeavor, in getting hold of the child's limbs in utero in order to move them, to seize them near a joint. Naturally, the hip-joint would be the one most accessible, and the femur the bone most frequently grasped. If a finger is slipped into the groin and traction made to extend the thigh, and so pull down the leg, the work is done at a disadvantage, for the weight, the leg, and foot are on the long arm of the lever, that is, the distance between the finger and the knee.

Kustner (*Handbuch der Geburtshülfe Muella,* iii, p. 311) says that if the finger or a hook slips upon the femur in doing this, the bone will break at its upper third, as that is its thinnest part, and that the fracture occurs at that part, if the force is used near it.

A case was reported from Professor Rubeska's Clinic in 1893 in which the femur broke at this place in a spontaneous delivery. In *Archiv für Gynäkologie,* Band xxx, p. 264, is reported a case with many fractures, both femora at the middle among them. Still, it would seem to be right to get the finger slipped along the front of the thigh to the knee as soon as possible to get the force near to the weight and shorten that arm of the lever. He was permitted to report also two cases seen by Dr. H. M. Sherman, as follows:

Case I.—June 23, 1894. An eleven weeks' old girl baby, normal apart from a deformity which consisted in a shortened

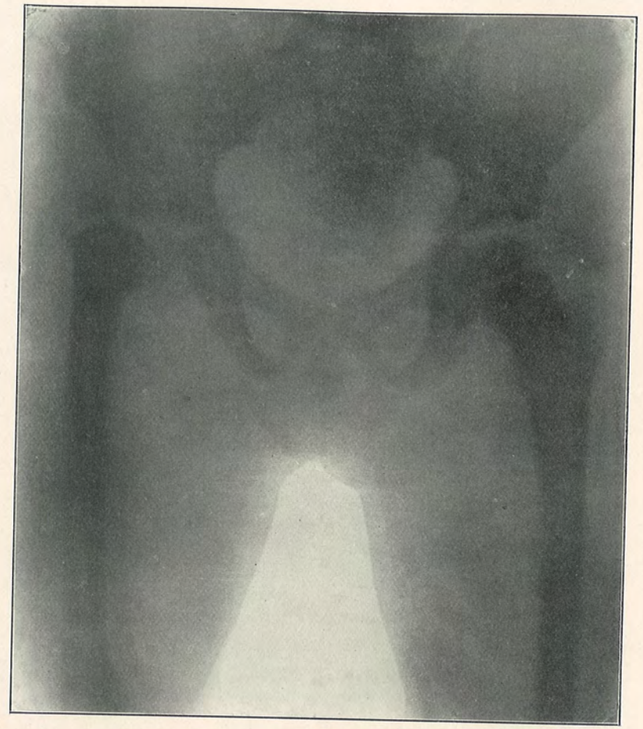

Fig. 1.—Congenital deficiency of the left femur.

condition of the left thigh, all the tissues being affected, the shortening being 4.5 centimetres. The history was of an easy non-instrumental birth, after a healthy and comfortable pregnancy. The mother was twenty-three years old, and this was her first child. The shortened condition existed at birth, but the child kicked the leg normally. During the last few days the child has held the leg flexed, and has cried if it was moved or handled.

Examination shows a depression or dimple in the skin on the outer side of the thigh at its middle. The knee and the leg and foot are normal, and of the same size as those of the other side. It is not possible to make out the femur through the soft tissues above the middle of the thigh. A false point of motion can be made out at about this point, and at times crepitus can be felt. There has evidently been an intrauterine fracture and much overlapping, and this must have occurred so early in intrauterine life as to have permitted the soft tissues to fit themselves to the shortened bone. Union probably took place with this overlapping, and a refracture has occurred within the past few days. There is nothing in the history of the mother's pregnancy that can explain the occurrence of the fracture.

July 30, 1894. This baby was put in a portable apparatus which permitted vertical traction to be made on the limb, and this was removed a few days ago. The child now kicks the leg about as she does its fellow. It is still impossible to palpate the upper part of the femur or the trochanter through the soft tissues.

August 14, 1894. To-day the presence and position of the trochanter can be made out. The limb is, roughly, 6.25 centimetres shorter than its mate.

December 12, 1894. To-day, through the dimple or cicatrix on the outer side of the thigh, the lower end of the upper fragment of the thigh can be felt. The shortening is the same.

July 15, 1896. The shortening is now eight centimetres, and is all in the femur. With a lift under the shoe, to compensate the shortening, the function of the limb is perfect.

August 16, 1897. The shortening is now nine centimetres. Child healthy and active.

August 28, 1898. The shortening is now 10.5 centimetres, and all in the femur.

September, 1900. This child has been found and has been radiographed, and the result is very confusing. There is a plain

coxa vara, with the appearance of the femoral neck having been fractured rather than bent down. This was probably the site of the fracture that was diagnosed, but incorrectly located, in June, 1894. There is no evidence of there ever having been any injury to the shaft of the femur, and the apparent discovery of the lower end of the upper fragment, in December, 1894, was a mistake, which is not now possible of explanation. The limb is still shorter, and the location of the fracture may explain the constant increase in the shortening by a possible injury of the epiphysis and interference with growth, both directly at the epiphysis and, by reflex action, through the whole femur.

The thigh is now, September, 1900, twelve centimetres the shorter, that is, the shortening has increased 7.5 centimetres since birth. The leg is of the same length as its fellow. The function of the joint and limb is perfect, and with a high patten, to compensate the shortening, the child gets about as well as other children.

If this case was one of fracture of the femoral neck in a newborn baby, the case must be a unique one.

Case II.—September 11, 1899. The child, a seven months' old baby, was born with the left thigh much shorter than the right. The skin and other tissues fit the short leg, *i.e.*, the tissues of the limb are shortened. No history of injury to the mother during pregnancy. No injury to child during delivery.

There is an angular deformity of the shaft of the femur, due to union in a faulty position after, possibly, intrauterine fracture of the femur. Child otherwise apparently normal.

The radiograph shows delayed ossification at the lower epiphysis and the entire absence of the upper epiphysis of the femur. Ossification in the shaft ends a little above the middle, and at the middle is a curve or knuckling of the bones or a faulty position after a fracture.

The prospect of benefiting the boy is slight; treatment is withheld, at any rate, for three months.

Dr. Edward P. Davis said that the case which Dr. Wilson had described was that of a rhachitic pelvis, in which labor began with the vertex presenting and the back directed to the left side of the mother. When the mother became exhausted, the forceps was applied and the head brought into the pelvic cavity, but the effort to deliver the head was not successful. It was found that

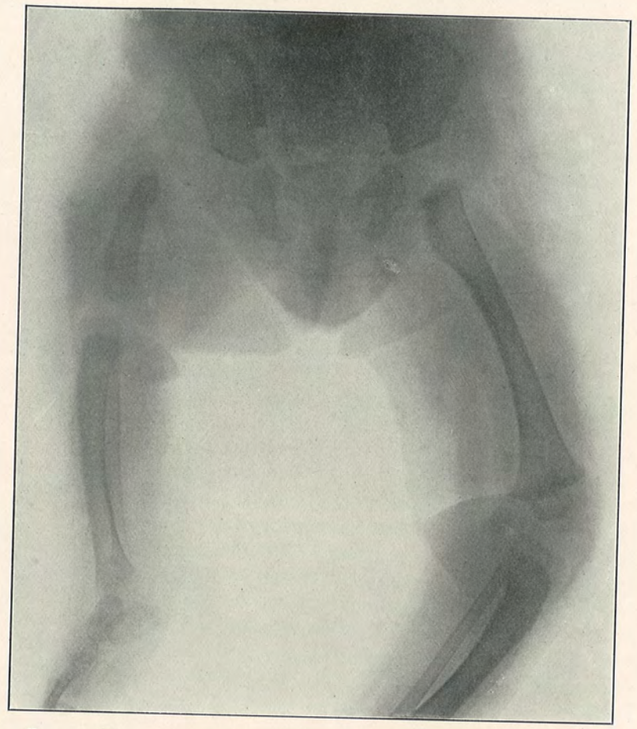

Fig. 2.—Shows delayed ossification at the lower epiphysis and entire absence of the upper epiphysis of the femur.

the shoulders had become impacted at the pelvic brim, the body of the child being turned transversely, and that delivery could not proceed. Accordingly, the forceps was removed and version was performed. The selection of version as a mode of delivery arose from the fact that in version one can much better control the delivery and passage of the shoulders through the pelvic brim.

In performing the version, it was found that owing to the long-continued labor, the escape of the amniotic liquid, and efforts at delivery, the child's body had become extended, the limbs being no longer flexed, but the feet and knees being in the fundus of the uterus. The legs were grasped near the knees, the grasp upon the limbs being as extensive as possible, and gentle traction was made, while the body of the child was rotated during traction in such a manner as to bring the back of the child towards the mother's abdomen. This was not a case in which the finger or an instrument was hooked into the groin, because this was not a case of breech presentation. The version was exceedingly difficult because of the long-continued labor and the fact that the child had become unfolded. Considerable force was applied upon the femora and in the actual turning of the child's body; this force must not have been that of traction only, but of rotation as well. The child was slightly asphyxiated when delivered, but was soon resuscitated.

Immediately after birth, the child was examined, but no fracture or luxation was made out at that time. About ten days afterwards, the Resident Physician reported impaired motion and pain upon handling in this infant. The child was accordingly examined a second time, but still without eliciting evidence of fracture. It seemed that very probably the sacro-iliac joint upon the affected side had been injured. The child's general development proceeded without interruption. The possibility of a green-stick fracture or of injury to the epiphyses was always considered and admitted.

In this connection, he added a report of a case of complete fracture of the humerus occurring under the following circumstances. The patient was in labor without medical attendance. During the labor, the head presenting, the hand of the child presented also. A woman who was assisting the patient, becoming frightened, made traction on the hand, and by vigorous pulling ended the labor. The arm of the child was found broken at

about the middle. Mother and child were brought to the Jefferson Maternity, when a complete fracture was evident. The child was dressed by utilizing the body as a splint and bandaging the arm to the trunk. It made a perfect recovery in function, length of limb, and continuity of form.

Dr. Davis further remarked that in general, from the standpoint of obstetric surgery, surgeons may be called upon to deal with fractures of the cranium, fractures of the clavicle, and of the long bones of the extremities. Omitting fractures of the cranium, excessive width of the shoulders may result in fracture of the clavicle, and in some cases it is necessary to sever this bone to perform delivery. Fracture usually occurs in difficult version or in cases of head presentation where the arm or shoulder is pulled upon vigorously to secure delivery. In performing embryotomy, if the shoulders of the child be excessively broad, obstetricians sometimes perform cleidotomy, cutting the clavicles with stout blunt-pointed scissors. This allows the shoulders to collapse, reducing the transverse diameter of the trunk.

Injuries to the shaft of the humerus occur in version where the arms become extended. In bringing down the arms, the effort is made to pass the fingers along the humerus to the elbow, thus flexing the forearm and carrying the arm towards the body of the child. In spite of this traction, cases occur in which the mother's condition is so grave that delivery must be effected at once, regardless of injury to the child. He recalled the case of a woman, thought to be dying from disease of the heart, in whom it was necessary to perform version and extract the child as rapidly as possible. The child's elbow became impacted at the brim of the pelvis, and in bringing down the arm the humerus was fractured. The child made a good recovery with the application of simple dressings. Separation of the epiphyses of the humerus may occur instead of fracture in version. Fractures of the forearm are rare. Fractures in the shaft of the femur are not common, and usually follow cases of breech presentation, in which strong traction is made with a hook upon the child's extended thighs.

Luxations of the large joints of the fœtal body may occur as the result of difficult delivery. The joints of the pelvis are subjected to considerable strain in moderately contracted pelves when the child presents by the breech, and the descent of the breech

must be brought about by traction in the groins of the fœtus. A blunt hook, such as that found upon the handle of the Hodge forceps, is sometimes inserted into the groin and traction made in this manner. Whenever possible, the finger should be used in place of the hook, as injury is not so likely to occur.

So far as Dr. Wilson's case is concerned, it had been his impression that the fracture resulted during the version. It may have been but partial, as it was not detected at the time, and may have become complete when the child was bathed and dressed, and when it grew strong enough to move its limbs.

Dr. W. Reynolds Wilson spoke of a case of supposed epiphyseal separation of the femur, with reference to the manipulative procedure which might have been responsible for the lesion. The fœtus, in the oblique position, namely, with the back forward and the head in the left innominate fossa, presented by the right shoulder. The right arm was prolapsed. He anæsthetized the patient and attempted to perform podalic version. An attempt was made to grasp both knees of the fœtus and bring the breech to the inlet, allowing the child to ride up out of the pelvis. In an attempt to grasp both knees, he found the greatest difficulty in rotating the child; but in making a second attempt, when he seized the upper knee only, the child was rotated without difficulty. It was still necessary for him to use great force to deliver the breech. As he extracted the breech, he felt distinctly what impressed him as a separation of the deeper structures of the anterior thigh. He afterwards dissected the child, which had been born dead, and studied the femur carefully. He found no fracture and no epiphyseal separation. Experimentally he wished to see what the bone would stand. He found that it resisted considerable force. In attempting, also, to separate the epiphysis at the head of the femur, he found that the juncture was protected by the capsular ligament which is carried down to the periosteum of the shaft proper, a condition of the parts which seems to be especially adapted to the protection of the continuity at this point. It appeared to him that the condition of ossification in utero must necessarily have much to do with the fractures and separation of parts of the bones, the seat of lesion found after delivery. In his examination of the bone of the femur, he was impressed with the spongy condition of the upper and lower portions of the shaft, also with the cartilaginous condition of the head of the bone.

Dr. Jopson remarked that since fracture of the femur at the time of birth is somewhat rare, he would report a case that he had seen two or three years ago at the Children's Hospital, in an infant three or four days old. The seat of fracture was about at the junction of the middle and upper third. There was marked tendency to flexion of the upper fragment, as in the first case reported by Dr. Wilson, in which the bone became united in that position. The child was several days old at the time of its first visit to the hospital, and the spasm of the muscles at this time was very great, probably due to the fact that the fracture had received no treatment up to that time. He treated it by applying a lateral pasteboard moulded splint, such as is often used with good results in fractures of the femur in infants; but the spasm was so great that the deformity had returned on subsequent visits. After two or three visits, the father discontinued bringing the child.

Dr. Wharton said that he had seen quite a number of cases of fracture of the femur in infants. These are usually in infants brought to the Children's Hospital, varying from a few hours to a few weeks of age. In many of these cases he could not find, in obtaining the history of the case, that the labor had been a difficult one. He was inclined to think in the majority of cases that the injury resulted from accidents after birth. In many cases the child had been allowed to fall, and in very few cases was there history of difficult or instrumental labor. In the majority of cases the injury seems to be in the upper third or near the middle of the shaft of the femur, and in such cases he usually found that there was an anterior deformity, due to flexion of the thighs, the upper fragment being drawn upward. He had been able to correct the deformity, and get satisfactory results without resorting to osteotomy. He had done osteotomy for correction of deformity following fracture of the thigh in older patients. In one case, a girl nine or ten years of age, there was a marked deformity in which a very good result followed an osteotomy. He had seen several fractures of the humerus in infants, coming under observation a few days after birth, which had apparently resulted from some manipulation during labor. He had also seen one or two cases of fracture to the clavicle following labor; but in his opinion fracture of the femur was much less common from labor than was supposed, and often fracture accredited to labor was due to some accident after labor.

Dr. Rodman said that recently he had seen a premature child at seven months, and very badly developed, who had a fracture of the right femur, with marked deformity. He had been asked to see the case with the attending physician on account of the fact that the latter feared to give an anæsthetic to such a premature and poorly developed child. He was able later to bring the limb into very good position without the aid of an anæsthetic.

Dr. Steinbach remarked that among the cases of fracture in infants which he had seen was one of fracture of the femur about the junction of the middle and upper third, with displacement of the upper fragment upward and outward. The breech had presented, and the accoucheur had experienced difficulty in extracting the child by hooking the index-finger into the groin. He saw the child on the fourth day. The fracture was a complete one. In treatment he used the inclined plane. Wire was shaped to the buttock and to the back of the thigh, which was flexed upon the abdomen, and the leg, which was flexed upon the thigh, securing these with a plaster bandage which held the fragments in firm position. The whole abdomen was surrounded by several turns of a like bandage. Within about sixteen days there was perfect union and the dressing could be dispensed with; only one dressing being necessary for the purpose. The child rested comfortably. The dressings were not soiled during defecation.

Dr. Willard said that he had seen several cases of fracture of the femur occurring during delivery, and, although the fracture frequently was not discovered until several days after birth, yet on questioning the mother or nurse they admitted that the child had cried whenever it had been handled. It seemed to him that this late discovery of these fractures explains the statement of Dr. Wharton attributing these injuries to falls after birth. In many cases the fracture has been produced by the application of the hook in the groin; direct traction upon the femur, instead of dislocating the head or carrying off the epiphysis, has resulted in fracture. He had always dressed these injuries immediately with plaster of Paris from the thorax to the foot, making strong traction on the fragments and putting them in position at the time. In every case he had had good union without any noticeable deformity, and union has always been speedy.

Dr. H. Augustus Wilson said that he believed that in a large majority of cases the so-called obstetric fractures are coin-

cidental, and not due to the obstetric procedures. He believed that they were, in the majority of cases, intrauterine, and he was drawn to that conclusion by statements made that fractures have been discovered at the time of birth, or shortly afterwards, in cases where the births have been very easy, and, in addition, by the statement of Dr. W. Reynolds Wilson in showing the tremendous power employed in podalic version in the case reported by him without injury to the bone.

He had tried his best with a number of fœtal femurs to break them by some such manipulation as Dr. Davis had resorted to. He had been unable in one of them to produce a fracture above the middle third. He had been able to produce a fracture at the middle third, and it was done by a pull and a twist at the same time. But in the case reported by him the fracture had occurred just below the trochanter, where the bone is thicker at the time of birth than the middle of the shaft, and where the strain would be possibly not as great as it would be either at the hip-joint or middle third; so he felt that Dr. Davis, with the strong hand and finger that he possesses, is unable to produce a fracture by his method of procedure.

In conclusion, he directed attention to the medico-legal aspect of the subject under discussion. He believed there was more than enough evidence that this fracture did not occur at birth, but previously, due to faulty process of ossification, and that it was a coincidence that forcible delivery was instituted.

ANGINA LUDOVICI.

By GEORGE G. ROSS, M.D.,

ASSISTANT SURGEON TO THE GERMAN HOSPITAL.

Ludwig's angina, or phlegmonous cellulitis of the floor of the mouth, is a comparatively rare affection. It is a disease which is so rapid in its development, and is attended by symptoms so distressing in character and accompanied by such a high rate of mortality, that any addition to the literature extant upon the subject may be of interest.

Ludwig, of Stuttgart, in 1836 was the first to describe the disease in detail, hence the name.

The disease is an infection of the thick layer of loose connective tissue which fills in the space between the symphysis of the jaw and the muscles of the floor of the mouth. This tissue is rich in lymphatics and blood-vessels, and contains the ducts of the sublingual and submaxillary glands. The disease may be either primary or secondary.

Primary infection may arise from wounds or ulcerations of the floor of the mouth and carious teeth; retarded development of the third molar or so-called wisdom tooth is an especially fruitful source of the trouble. Frequently a third molar will develop in the angle of a jaw already filled with teeth, causing pressure necrosis of the tooth and the portion of alveolar process of the jaw forming its bed, thus giving rise to an abscess and a subsequent infection.

The secondary infections arise in conjunction with those infectious diseases which are accompanied by manifestations in the mouth, *e.g.*, diphtheria, scarlet fever, tonsillitis, etc.

An interesting discussion has arisen as to the differentiation of the acute infectious diseases of the larynx, pharynx, and floor of the mouth. Semon (Royal Medical and Chirurgi-

cal Society, London, 1895, Vol. lxxviii, pages 181-238) claims that "the various forms of acute septic inflammation of the throat and neck, hitherto considered as so many essentially different diseases, are in reality so pathologically identical that they merely represent degrees varying in virulence of one and the same process, that the question of their primary localization and subsequent development depends in all probability upon accidental breaches of the protecting surface through which the pathogenic micro-organism, which causes the subsequent events, finds an entrance, and that it is absolutely impossible to draw, at any point, a definite line of demarcation between the purely local and the more complicated, or between the œdematous and the suppurative forms."

He reports fourteen cases, all of which were of the secondary type of infection. It would seem clear, from his cases, to consider the acute septic infection of the larynx and pharynx as one and the same disease, and, so far as the character of the invading micro-organisms is concerned, the primary may be included.

However, in true angina Ludovici the course is different and the infection essentially primary. The point of entrance is in the mouth proper, and the disease manifests itself primarily in the floor of the mouth, and secondarily in the pharynx and larynx.

The pathology so far as known is very similar, if not identical, with that of erysipelas. The organisms which have been discovered, from the researches of modern investigators, are the streptococcus and the staphylococcus. It has been suggested that there is some organism which is especially virulent and active in this disease, but as yet it has not been discovered.

G. Leterier ("Du Phlegmon sublingual dit Angina," Thèse, Paris, 1893) has collected thirty-one cases with thirteen recoveries. This series includes cases collected from old literature, and the mortality is therefore higher than at present. Early recognition of the disease and prompt surgical interference will in all probability still further reduce the death-rate. Spontaneous cure by rupture of the abscess into the mouth

may occur, but the majority will terminate fatally unless operation is instituted.

The symptoms are marked from the onset of the disease. They develop very rapidly and are of the greatest severity. Frequently, in a few hours after the earliest manifestation of the disease, a hard swelling will be found between the arch of the lower jaw and the hyoid bone. The swelling spreads rapidly, soon involving the neck and face in a hard, dark red, brawny induration. Respiration is soon impeded by involvement of the deep connective tissue of the neck. The pharynx and larynx become involved, and attacks of acute dyspnœa with cyanosis supervene. The swelling may spread downward to the anterior mediastinum and on to the chest wall. Inspection of the mouth, although unsatisfactory, due to fixation of the jaw, will disclose the sublingual tissue to be so œdematous as to push the tongue against the roof of the mouth. In the early stage the swelling is unilateral, but soon both sides become involved, and deglutition becomes difficult or impossible. Supervening the local condition a marked general sepsis occurs.

CASE I.—Dr. W. S., while studying in Berlin, had an acute infection of the submaxillary region arising from a necrotic and undeveloped wisdom tooth. The inflammation developed rapidly, and in twelve hours from the onset of the attack the symptoms were so marked that operation was demanded without further delay. The wisdom tooth being pried away from the last molar, fetid gas and pus escaped; the inflammatory mass in the submaxillary region was then incised. The symptoms rapidly subsided, only to recur a few weeks later, when he was again operated upon and the offending tooth chiselled out.

CASE II.—Carl S., Austrian, aged twenty years. Family history good. Personal history excellent. Gastric fever at the age of six; no venereal trouble. Uses alcohol moderately and tobacco in excess.

He worked his way to this country, and attributes his bad teeth to neglect during the voyage. He is a printer by trade, but had been a farm-hand for the three months of his residence in

America. He had had toothache for four days prior to his admission to the German Hospital, September 29, 1900, about 8 P.M. At the time of admission there was some swelling and induration in the left submaxillary region, red and angry looking, very painful to touch, and interfering with the motions of the jaw. Respiration, 24; temperature, 102° F.; pulse, 86, full and bounding. Three hours after admission he awoke with a marked dyspnœa and cyanosis, which partially subsided, only to recur again with increased severity. The attacks of dyspnœa seemed to come in periods, and were relieved by violent voluntary inspiration. He would grasp the porch railing, extend his neck forcibly, and thus enable himself to inspire enough oxygen to last for a few minutes. The house surgeon prepared for an immediate tracheotomy, which, however, was deferred from time to time upon the amelioration of the attacks. By 12.30 the induration and swelling had extended from the angle of the jaw on the left side to that of the right and down the neck to the clavicles. The hyoid bone and pomum Adami could not be made out. The swelling was hard, very painful, dark red, and brawny in character, not unlike that of erysipelas.

The chin was held well advanced and rigid. The jaws were separated about half an inch, and between the teeth the under surface of the tongue could be seen; the latter being pushed upward to the hard palate by the œdematous sublingual tissue. The jaws were forced apart, disclosing a general œdema of the anterior pillars of the fauces, buccal mucous membrane, and the sublingual tissues; the last two molars were carious, and an undeveloped wisdom tooth was present.

An incision was made into the œdematous sublingual tissue on both sides of the frænum. A considerable amount of bloody serum escaped, and in a few minutes his respiration became less labored. Ice-bags were applied, and the patient returned to bed; he slept for some hours. The temperature reached 104° F. and the pulse 118 by 5 P.M., September 30.

On October 1 the swelling had increased until it extended upward upon the face as far as the zygomatic arches and down upon the chest wall to midsternum. Fluctuation was now unmistakable for the first time just below the symphysis of the jaw. A few whiffs of chloroform were administered, and the abscess opened by an incision which went through the muscles forming

the floor of the mouth. The abscess cavity extended around the entire underside of the jaw from angle to angle. The pus which escaped was extremely fetid. As this stage of the proceeding was reached, the patient ceased breathing, necessitating an immediate tracheotomy, and this in a neck with obliterated landmarks. Respiration being re-established, the operation was completed by the removal of the offending teeth. A mallet and chisel were necessary for the extraction of the wisdom tooth. The patient reacted promptly. By the fourth day after operation two patches of impaired resonance could be made out, one in the right lung in the midaxillary line, the other at the left base. There was, however, no evidence of a frank pneumonia.

On the fifth day, a secondary abscess on the right side, extending from the submaxillary region to the zygomatic arch, was opened, which allowed a quantity of fetid pus to escape. Prior to the evacuation of this secondary collection deglutition had been impossible, and rectal alimentation had been resorted to. In a few hours he was able to swallow liquids freely. The tracheal tube was removed in thirty-six hours. The convalescence was progressive despite an attack of bronchitis. The after-treatment consisted of iron, quinine, and forced nourishment.

As a result of the inflammation of the larynx, aphonia has resulted. The condition of his larynx (as reported by the laryngologist) is as follows: "The larynx shows evidence of an attack of perichondritis. The vocal cords are hidden by the greatly swollen and thickened ventricular bands. The arytenoid cartilages are also obscured by swollen mucous membrane which also involves the interarytenoid space. There appears to be no paralysis of the laryngeal muscles, but their normal action in phonation is prevented by the greatly thickened condition about them. Directly in the centre of the laryngeal opening a passage sufficient for respiration leads down to the trachea, between the swollen ventricular bands."

The pathological report states the bacteriological findings as follows:

"Examination was made of the patient's blood and of pus from the wound, both taken October 2, 1900. The blood was removed from the median cephalic vein by means of an aseptic hypodermic needle after aseptic incision of the skin overlying the vein. A moderate quantity of blood was introduced into six

bouillon tubes and four agar tubes. These were examined on several occasions, but all remained sterile at the end of ten days. From the pus cover-slip preparations were made and several bouillon tubes and agar tubes were inoculated. The cover-slip preparations revealed staphylococci and streptococci. The inoculated tubes also revealed streptococci and staphylococci; the latter by further culture methods proved to be the staphylococcus pyogenes aureus. On October 6 another examination was made of the pus from the wound, cover-slip preparations and inoculations again being utilized. These again revealed the staphylococcus pyogenes aureus and the streptococcus pyogenes. The latter grew both in short chains as well as in long chains, many of them being excessively long. Blood count: Hæmoglobin, 63 per cent.; erythrocytes, 4,630,000; leucocytes, 9800."

There is another lesson to be learned from a study of Case II. The character and intensity of the symptoms and the destructive tendency of the inflammation lead to the isolation of the patient. The pathological findings indicate that the disease is in all probability erysipelatous in character, and therefore, in an active surgical hospital, these cases should be isolated.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 3, 1900.

The President, DE FOREST WILLARD, M.D., in the Chair.

CHOLECYSTOSTOMY FOR OBSTRUCTION OF THE CYSTIC DUCT.

DR. HENRY R. WHARTON presented a woman, aged fifty-three years, who was admitted to the Presbyterian Hospital, January 23, with the history that for some years she had suffered with indigestion and intermittent attacks of jaundice, paroxysmal pain, chills and fever, which symptoms persisted, varying in severity, up to the time of her admission to the hospital. Upon examination it was found that she was much emaciated, weighing only sixty-seven pounds, and was deeply jaundiced; the abdomen was moderately distended, and palpation showed that the liver dulness extended downward beyond the umbilicus.

The patient was etherized and an incision made, and the gall-bladder was exposed with some difficulty, as it was very much contracted, being not over three inches in length and three-fourths of an inch in diameter, and as it was overlaid by the hypertrophied liver. When it was exposed and palpated it was found to contain several stones. It was also adherent to the surrounding tissues. As it was found impossible to bring the gall-bladder up to the surface of the wound and suture it to the tissues of the abdominal wall, the intestines were carefully packed away from the bladder with sterilized gauze, which was held in place with retractors, so that a free exposure of the gall-bladder was obtained. The gall-bladder was then opened and several stones were removed, and at the upper part of the organ a large-sized stone was found, a portion of which was impacted in the cystic duct, the remaining portion protruding into the gall-bladder. This was removed with