tient looked markedly worse; the septic appearance was increased. There was at this time (March 24) some dullness and some pain over the gall bladder, and appendix, general rigidity of the abdomen, and much tenderness over the eighth, ninth and tenth ribs left laterally. Blood count at this time gave 37,000 white blood cells and 95 per cent. polynuclears. The urine was reduced in quantity; the urea output markedly reduced; very large percentage of albumin, considerable bile. The sputum was unchanged. On more careful examination of the chest it was concluded that the left lung was collapsed; there was tympany to the third rib, dullness above, metallic tinkling and amphoric breathing over the base. The diagnosis was revised to disease of either gall bladder or appendix, subphrenic abscess and pyopneumothorax.

First Operation.—Under ether, March 22, the abdomen was opened; the gall bladder was found normal, and the appendix inflamed. There were recent and old adhesions and general peritonitis; the omentum was glued to the parietal wall. No abscess was located. There was some serosanguineous fluid in the pelvis. The appendix was removed and the wound closed. Aspiration of the thorax gave negative results, so the chest was not opened.

Second Operation.—The next day, the septic symptoms becoming worse, it was deemed proper to explore the left subphrenic space and left chest further. The patient being unfit for a general anesthetic, a diagonal incision was made beneath the eighth, ninth and tenth cartilages. The subphrenic spaces were explored but no pus cavity found. Aspiration of the chest showed a few drops of liquid pus. A rib was resected and two drams of thin, odorless pus was turned out.

The patient died next morning at 10 a. m.

Autopsy.—The left lung was collapsed; there was an area of healed tuberculosis in the left apex; no free pus in the pleura, but the lung covered with organized pus so adherent that it was with difficulty removed; the same condition existed between the lobes. There was pus of the same character in the anterior and middle mediastinal spaces; the mediastinal glands were enlarged but not suppurating. The pericardium was adherent and purulent with the same kind of pus; the right lung was about normal, but beneath it, lying on the diaphragm, was a small amount of organized pus. The left subphrenic space contained two or three drams of thick organized gelatinous pus, as did the right subphrenic space; there was no abscess cavity and no marked adhesions. The right kidney space at the upper pole contained similar pus; no stone or pus was found in the kidney; both kidneys were enlarged and bile-stained; the capsule stripped easily. The liver was enlarged, otherwise normal. The stomach was normal except some adhesions in the gastrohepatic area; on its anterior surface was an old scar of a healed ulcer; it had no adhesions about it and did not show on the outside to either inspection or palpation. The duodenum and gall bladder were normal. The pancreas was somewhat sclerotic, there was no hemorrhage or abscess. There was nothing in the lower abdomen but adhesions and seropurulent peritonitis.

From the fact that there had been an old appendicitis and that no other source of pus was found and that pus was in the subphrenic space on both sides and in the right kidney space, we are forced to conclude that there was, first an appendicitis with insignificant symptoms and without suppuration causing a subphrenic abscess, and later a general peritonitis secondary to the abscess with lymphatic infection to the lung. Eisen-drath in an article in 1908 speaks of this condition but found but six cases of left subphrenic abscess due to appendicitis.

The time consumed in developing such widely disseminated foci and pus of the organized quality must have been considerable. Unfortunately no bacteriologic examination was made of the pus.

DARK-GROUND ILLUMINATION WITH ORDINARY MICROSCOPE EQUIPMENT

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The interest in the *Spirochaeta pallida* has brought the methods of dark-ground illumination into prominent use for practical purposes. The following is a method of securing this form of illumination, without the aid of special apparatus. The only things needed are a microscope-stand fitted with an Abbé condenser of 1.20 N. A. or 1.40 N. A.—focusing screw for the condenser—a swing out ring below the condenser (such as is fitted to most microscopes, for holding a blue glass disc), 16-millimeter and 4-millimeter objectives, the latter preferably of low aperture (0.65 N. A.), although the one with a higher aperture will do. The illuminant may be a simple one-inch flat-wick oil lamp, although a high power single glower nerust lamp is very much better. Dark-ground illumination is easily obtained with low power objectives, therefore it is best to practice with the 16-millimeter lens before using the higher power necessary to distinguish the spirochete,

Cardboard center-stop for use in dark-ground illumination.

following the directions given below:

Using the 16-millimeter objective, take a slide of sedimented urine, or scrapings from the mouth, containing epithelial cells. First focus the object, then focus the condenser until the image of the light source (the flat side of the flame from an oil lamp, for instance) is seen in the field with the object. Provide a center-stop cut out of cardboard or heavy dark paper like the diagram—a circular disc, having a portion between the rim and the center cut out, as shown by the unshaded part. This kind of diaphragm comes with most microscopes, but can be readily made. Several such discs should be cut out, leaving central stops of different sizes. The outside diameter of the disc, of course, must fit the turn-out ring that is placed below the condenser. With the object and the light source both in focus, as stated above, put a small disc under the condenser. If that does not completely darken the field, use a larger disc, and finally alter the focus of the condenser a trifle until the field is black, and the objects stand out brilliantly. This method, with the 16-millimeter objective and high ocular facilitates the search for casts. When one is found, merely swinging out the ring carrying the center-stop brings direct illumination into use.

It should be added that when using dark-ground illumination the iris diaphragm below the condenser should be wide open to start, and then it can be partially closed, if necessary, to make the field darker. It is easy to get a dark-ground with the low-power objective, but when using the high power the difficulties increase. The best method is first to put a large drop of cedar-

oil on the condenser and put the slide in contact with the oil. This slide may have a drop of syphilitic serum, or, for learning the method of dark-ground illumination, one may take a drop of stale urine or sewage, which is loaded with bacteria. Focus the object with the low power, then focus the condenser so that the image of the light source (say the edge of the flame) is on the same plane as the object, taking care that the cedar-oil maintains the connection between the slide and condenser. If the oil will not fill the gap, use a thicker slide, or use two thin slides, with a drop of oil between them, and another drop between the lower slide and the condenser. Now put the 4-millimeter objective on the microscope, focus the object with a small iris diaphragm, then open the diaphragm and put one of the center-stops under the condenser. Now change the focus of the condenser slightly if necessary, or shift the mirror a little, until the bacteria or other objects are bright on a dark background. Of course, it may be necessary to try several sizes of center-stops below the condenser, but once a certain size is found to work right, that one can be used regularly with that objective. I have used the above described method with a Leitz No. 7 objective, as well as a Spencer 4-millimeter, and while the results are not so good as with a reflecting condenser (on account of chromatic aberration), it has the merit of requiring no extra apparatus. My own preference, in searching for spirochetes, is to use an apochromatic dry objective and an achromatic oil-immersion condenser of English make, but an ordinary outfit will do the work fairly well.

To get the best results from any apparatus, one should know the principles underlying its use, and to get a good exposition of the general principles of dark-ground illumination, the books by Spitta and by Wright on microscopy are very valuable. But it is well to mention here that several amateur microscopists (that is, not medical men) of England, than whom there are no more skilful manipulators, have emphasized the danger of spurious images from dark-ground illumination. This does not apply to the spirochete, so much as to the other objects that may be viewed by this method.

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ACUTE CHOLECYSTITIS COMPLICATING TYPHOID FEVER

REPORT OF THREE CASES, WITH OPERATIONS

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The infrequency of reported cases in which cholecystitis has been observed as a complication of typhoid fever would lead one to believe this condition extremely rare, or that it might not have been looked for with the same vigilance as other complications. The post-typhoid cholecystitis, with at times calculus formation, has for some time been recognized as a frequent sequel of typhoid fever. Many of the cases must have been the result of an acute cholecystitis occurring during the attack of typhoid, the acute symptoms subsiding, leaving a chronic cholecystitis present. These patients with chronic cholecystitis are often operated on and the presence of the *Bacillus typhosus* demonstrated months or years after the attack of the fever. Then, if many sur-

vive the acute cholecystitis, which very likely resulted from the typhoid attack, it is quite reasonable to think that there are many who die from this cause during the course of the fever.

I believe that acute cholecystitis, of sufficient severity to demand operative procedure, is of far more common occurrence than has heretofore been supposed, and the following cases may, therefore, be found of interest:

CASE 1.—History.—The patient, Mrs. S. B., aged 38, had had the usual diseases of childhood; otherwise she had always been healthy except for some stomach trouble during the previous six or eight years. She was taken ill on May 31, 1908, with pain in the abdomen, diarrhea and headache. She had complained of headache for the previous ten days, and had had some pain and tenderness in the abdomen, no appetite, and slight diarrhea.

Examination.—The tongue was red; the lungs normal; the abdomen slightly distended and tender. The spleen was enlarged; the temperature 100; the pulse 90. Blood examination: white blood count, 3,800; red blood count, 4,500,000; Widal negative; hemoglobin 95 (Tallquist). The urine was negative. Diagnosis, typhoid fever.

Course of Disease.—June 8: Spleen very much enlarged; white blood count 4,200; Widal positive. Temperature had continued to rise until at this time it was 103 to 104 in afternoon. Rose spots were very abundant. This case ran a course typical of typhoid fever for five weeks. The temperature and pulse became normal, remaining so for several days, when the patient again had a rise for several days. At this time the leucocyte count was 4,000. The relapse lasted for several weeks and had about reached the normal on July 31; then the patient had a severe pain over the region of the gall bladder; the temperature rose to 105, the pulse 170 to 180. There was vomiting; the facial expression became very anxious; there was considerable tenderness over the region of the stomach and gall bladder. The blood showed at this time 11,000 leucocytes. (No differential count was made.) Diagnosis of a cholecystitis with perhaps perforation was made. I called in Dr. Lull, who concurred in this, and while the chances from operation did not look very encouraging we earnestly insisted on this and gained the patient's consent after a few hours' wait. At this time (five hours later) the leucocyte count had risen to 15,000, which was about 11,000 increase from a few days previous.

Operation.—The patient was placed on the operating table about ten hours after the first pain was felt. I made an incision over the gall bladder, and found this organ very much distended. On the fundus was a small necrotic area through which the very thick, dark-looking bile was being discharged. This bile was of the consistency of jelly, which accounts for the gall bladder not entirely emptying itself into the peritoneal cavity. Cholecystotomy was performed, using a rubber tube covered with a cigarette drain. I closed the gall bladder around this with a purse-string suture. The entire operation was completed and abdomen closed in eighteen minutes. The patient's condition seemed no worse than when the operation was commenced (which was bad enough). The patient was given hypodermoclysis on the table, and after the operation saline enemas, strychnin and spartein sulphate were given every three hours. In eighteen hours the temperature was 98.6, pulse 100, and the patient made a rapid and uninterrupted recovery. The gall bladder discharged no bile until after the fourth day, when bile was freely discharged.

CASE 2.—History.—J. D. Almond, aged 23, was brought into the hospital on Sept. 1, 1908, the sixteenth day of typhoid fever. His previous history was good until the development of the present attack. When admitted to hospital the patient was suffering with severe pain over the gall bladder region, but had not complained of this until put on train to be brought into hospital.

Examination.—The eyes were normal; the tongue red and very dry; the heart and lungs normal; the spleen very much enlarged. There was tenderness over the gall bladder. The temperature was 103; the pulse 128. The abdomen was distended and rigid. The patient was nauseated and had vomited