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PNEUMOCOCCUS POLY-ARTHRITIS, RESEMBLING ACUTE
RHEUMATIC FEVER.

BY

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The rarity of pneumococcus arthritis is sufficient excuse for the reporting of five fatal cases followed by autopsy and corroboration made by microscopic examination. Four of the cases had a previous history of acute rheumatism, and one had chorea. In four the arthritis preceded other affections by an average period of about 6 days (cases 1, 2, 3 and 5) and in case 4 the arthritis occurred three days after the onset of pneumonia. Two of these cases (4 and 5) developed broncho-pneumonia, one lobar pneumonia (case 2), and all had acute and chronic endocarditis. The two cases (1 and 3) without pneumonia, simulated closely in their course acute rheumatic fever.

The papers by Cole (*American Medicine*, May 31, 1902), and Howard (*Johns Hopkins Hospital Bulletin*, Nov., 1903), make an extended discussion in this report unnecessary. The three cases reported by Howard brought the number to 72.

The organism isolated in the present series of cases corresponds to the pneumococcus in every respect. Those obtained in all the cases were identical, and the only points of special interest are low virulence for animals, an unusual vitality upon culture media in the case of the organisms obtained from fatal cases.

Case I.—Clinical Summary.—Rheumatic fever at seven years of age. On first day of present illness, arthritis of left ankle. 2nd day, arthritis of right foot. 3rd day, arthritis left shoulder. 5th day, acute pericarditis. 6th day, hydrothorax. 9th day, death.

M. E. D. Female, age 16. Service of Dr. Finley. Admitted October 8, 1908, complaining of pain in left shoulder and both ankles.

Personal History.—She was born in Montreal, and had always lived there. She had whooping cough and measles when a child, but never had scarlet fever, diphtheria, tonsillitis or chorea.

When seven years of age she was in the General Hospital two months

with acute rheumatic fever, involving the knees and ankle joints, but we have no record of her heart condition. At 14 years of age she was again in the hospital with rheumatic fever and pneumonia. At 15 years of age she was again two months in the hospital with rheumatism involving the left elbow and left knee, and the right ankle and right knee. On examination at this time she was found to have increased cardiac dulness. The first sound at the apex of the heart was replaced completely by a blowing systolic murmur transmitted to the axilla, and a short systolic murmur heard at the pulmonary artery. At this time she was given sodium salicylate gr. xv every four hours, after which the pain lessened and the temperature fell to normal in 48 hours, where it remained during her stay in the hospital.

During the summer, before her present admission, her feet and ankles occasionally became swollen and painful.

The present illness began on October 4, four days before admission, with an attack of pain in the left foot. On the following day this foot was better, but the right became involved and has remained so until the present. Three days later the left shoulder became very painful, even the respiratory movements causing discomfort. The pain in the above joints was of a sharp stabbing character, and only felt on movement. During this time she was nauseated, vomited several times daily, and has perspired freely at night. She did not feel feverish, but has eaten scarcely anything and has been constipated.

Present Condition.—On admission she is found to be a well-nourished girl of about stated age. She is somewhat anæmic and drowsy. She assumes the dorsal decubitus and is apparently suffering some pain. The temperature is 100½. Pulse 112. Respiration 44.

There is some tenderness in each axilla, but no glandular enlargements can be made out.

The skin is very pale, warm and moist. The mucous membranes are pale and the lips dry.

Respiratory System.—Normal.

Circulatory System.—There is no præcordial pain, no palpitation and no dyspnoea. There is a diffuse cardiac impulse over the præcordial region. No thrill is felt. The relative cardiac dulness extends perpendicularly to the 2nd rib, and transversely at the 4th rib, 3 cm. to right and 13 cm. to left mid sternum.

At the apex the first sound is replaced by a blowing systolic murmur transmitted to the axilla.

The pulse is 112, regular, of small volume and low tension.

Locomotor System.—The left shoulder and both ankles are tender

and very painful on movement, but are neither swollen nor red. There is no loss of function in any of the joints from previous attacks.

Digestive System.—Normal.

Urine.—Sp. Grav. 1022, acid. No albumen, sugar or casts.

Blood count shows:—

Red cells	3,546,000
White cells	16,200
Hæmoglobin	70%

Diary.—October 9th, (the day following admission). The pain in the affected joints is somewhat decreased, there is anorexia and vomiting at intervals and general marked discomfort. There is severe pain in the præcordial region which came on suddenly this afternoon, and a definite to and fro friction rub is heard with maximum intensity in the 3rd left interspace 3 cm. from mid sternum.

Temperature 98-102. Pulse 116-128. Respiration 28-40.

October 10.—The joints have improved, there is no pain on movement, and no swelling or tenderness. There is, however, severe pain over the præcordium. The friction rub is louder than before. There is dullness at the base of the right lung from the 8th rib downward, with blowing breathing.

Temperature 98-100. Respiration 28-40. Pulse 112-124.

October 11.—There are signs of fluid in both pleural cavities, and the blowing breathing persists at the right base. There are, however, no friction rub or rales.

Temperature 97. Pulse 96-112. Respiration 20-40.

October 13.—She still complains of pain over præcordium. There is no change in the cardiac dullness, over all of which the friction rub is now heard. She is very weak and does not respond to stimulation.

The pulse is very feeble and of small volume, 124-140. Respiration 32-40. Temperature 98¼.

Sodium salicylate was not used at this time, but aspirin gr. x every four hours was given.

She gradually sank and died on the 9th day of the disease.

Autopsy performed 20 hours post mortem.

Anatomical Diagnosis.—Acute fibrinous pericarditis; acute and chronic endocarditis; myocarditis; chronic pleuritis; acute nephritis; passive congestion of liver and spleen.

The *Peritoneal Cavity* contains about 500 c.c. of clear fluid, otherwise normal.

Pleural Cavity.—On the left side there are about 100 c.c. of brownish coloured fluid. The apex of the left lung is adherent to the chest wall,

and the base of the right lung is adherent to the diaphragm by old fibrous bands.

Lungs.—Both organs are voluminous and crepitant throughout, and on section there is no evidence of pneumonia.

The *Pericardial Cavity* contains about 50 c.c. of brownish turbid fluid. The visceral and parietal pericardia are firmly adherent to each other by a grayish, fibrinous exudate which hangs in shreds from the separated surfaces.

Heart.—*Weight* 375 grms. In the anterior wall of the left ventricle there is an area 1 cm. in diameter, of a pale grayish colour and friable consistence. Elsewhere the myocardium is firm and of normal colour. The coronary arteries are normal. The aortic valve measures 5.5 cm., and on each corpus Arantii there is a small red, fibrinous vegetation about 3 mm. in diameter. The mitral valve measures 9 cm. Its cusps are considerably sclerosed and contracted, while over their edges are scattered a few small reddish vegetations.

Kidneys.—*Weight* 360 grms. On section they present a fairly well-marked acute nephritis.

The left shoulder joint contains a small quantity of slightly turbid fluid. The synovial membrane, however, is smooth and glistening.

Bacteriological Report.—No cultures were taken during life, but, at autopsy, cultures made from the heart's blood, the pericardium, the area of degeneration in the myocardium, and the shoulder joint revealed the organism described below

Case II.—*Clinical Summary.*—Three previous attacks of acute rheumatism. Present illness began with arthritis. 2nd day, lobar pneumonia. Death 10th day.

E. T. Age 16. Service of Dr. Finley.

Was admitted to the General Hospital on February 27, 1909, complaining of pain in the chest and smothering sensations.

Personal History.—She was born in Montreal, had always lived here, and was a strong healthy child until 4 years of age, when she had whooping cough. She then had measles, and this was followed by bronchitis, which persisted for several weeks. Since then she has never been really well, but was subject to "colds" which were always accompanied by thick whitish sputum. Her appetite has always been poor.

At seven years of age she was in the Royal Victoria Hospital two months with acute articular rheumatism. After leaving there she gained in weight, but has had recurring pains in the joints of the arms, hands, legs and feet ever since, and has had shortness of breath on exertion.

From July 17th, 1908, until September 1st of the same year, she was

in the General Hospital with acute articular rheumatism involving both knees and the left ankle. The relative cardiac dullness at this time was increased, with a soft systolic murmur at the apex.

From November 9 to December 12, 1908, she was again in the General Hospital, during which time the wrists, ankles, right knee and several of the metatarsal and metacarpal joints were swollen, red, tender and painful, and there was a rough, blowing systolic murmur at the apex, and occasionally a gallop rhythm could be heard.

Present Illness.—Began on February 22, 1909, with general malaise. The left ankle became swollen, red, tender and painful on movement, but she had no sore throat. On the following day she began to have pain in the chest with smothering sensations. In a day or two the ankle was better, but the pain in the chest continued until admission.

Present Condition.—Patient is a moderately nourished child. The face is rather pale and the lips somewhat cyanosed. The skin is moist and cool. The subcutaneous tissue is in moderate amount, and the muscles are small. There are a few small herpetic patches on the lips. The post cervical glands are somewhat enlarged, but elsewhere are normal, and there are no subcutaneous fibrous nodules. The pulse is 126—regular, small volume and low tension. The præcordium is slightly bulging. The cardiac impulse is seen in the left 5th and 6th spaces 10 cm. from the mid-sternal line. The relative cardiac dullness at the 4th rib extends 2 cm. to the right and 10.5 cm. to the left of the left mid-sternal line.

The sounds at the apex are muffled, and there is a soft systolic murmur transmitted to the axilla and heard at the back. The second sound at the pulmonary cartilage is much accentuated.

Respiratory System.—There is a frequent, short, hacking cough, but very little expectoration. There is slight dilation of the *alæ nasi* and the breathing is rapid, 44 to the minute. The lungs are resonant anteriorly to the 6th rib on the right side and the 4th rib on the left, and here the breathing is vesicular. Posteriorly, there is dullness below the 9th rib on the left side, and occasional sub-crepitant rales can be heard at both bases. The sputum contains no tubercle bacilli.

The white cell count is 17,000.

Temperature 101 $\frac{2}{8}$. Respiration 44. Pulse 120. The urine is normal.

Diary.—March 2, 1909.—The child does not appear so well. The lips and finger-nails are cyanosed. The face is pale, and the extremities are cold.

The cough persists and she occasionally expectorates a small amount of tenacious, blood-stained sputum. She has occasional spasms of severe

præcordial pain. The dullness has not increased at the base of the left lung, but fine crepitations may be heard all over the chest.

There is some œdema of the ankles.

March 4, 1909.—She is gradually becoming weaker. The face is very pale. The lips, hands and feet are blue, with œdema of the ankles. She has to sit up to breathe, and no radial pulsation can be felt.

The dullness at the base of the left lung is somewhat increased. Over this area there is a definite to and fro friction rub, and large rhonchi are heard all over the chest. The sputum is still tinged with blood, is viscid and closely resembles that in pneumonia. The liver dullness has not changed.

Temperature 98-101. Respiration 33-44. Pulse 118-120.

(Death followed shortly after the above note).

Autopsy performed 20 hours after death by Dr. MacLachlan.

Anatomical Diagnosis.—Acute and chronic endocarditis; chronic pericarditis; lobar pneumonia; chronic pleuritis; passive congestion of liver and spleen.

The *Peritoneal Cavity* contains a small amount of clear straw-coloured fluid.

Pleural Cavity.—There are a few recently formed fibrous adhesions at the base of the right lung. The lower lobe of the left lung is definitely pneumonic.

Pericardial Cavity.—The visceral and parietal pericardia are firmly adherent by a dense fibrous exudate which almost completely obliterates the sac.

Heart.—Weight 280 grms. The myocardium is slightly pale in colour and of somewhat friable consistence. The aortic valve measures 6 cm; and on its cusps are a few small recently formed vegetations. The mitral valve measures 9 cm., its cusps are considerably thickened, and engrafted on them are a few small reddish vegetations.

The coronary arteries are normal.

On opening the ankle joint in this case the amount of fluid is only sufficient to moisten a swab and, therefore, too small to determine its appearance. The synovial membranes, however, appear normal.

Bacteriological Report.—Cultures made at autopsy from the heart's blood, the pericardium and the left ankle joint revealed the pneumococcus.

Case III.—Clinical Summary.—Acute rheumatism at 13 years of age. Present illness began with arthritis. 9th day slight hydrothorax. 37th day aortic insufficiency. Death 101st day.

S. R. Female. Age 14. Service of Dr. Finley. Was admitted to

the General Hospital on December 3, 1908, complaining of pain and swelling of both knees.

Personal History.—She was born in Russia, came to the United States at 10 years of age and to Canada 4 months before admission. At thirteen she was in a New York hospital 2 weeks with acute rheumatism involving the right knee, and at this time she was told she had a weak heart. She has never had a sore throat, dyspnoea, or epistaxis. She has had an occasional cough, but no sputum, and has never noticed any swelling of her feet. The present illness began 4 days before admission with pain, slight swelling and tenderness of the right knee, loss of appetite and general feeling of malaise. She had no chill and did not perspire.

Present Condition.—Patient is a slender, moderately nourished girl of 14 years. She is bright and intelligent. The skin is pale, warm, and moist. The mucous membranes are somewhat pale and the tongue coated. The subcutaneous tissue is in moderate amount, and the muscles are of fair size.

Pulse 116. Temperature 100. Respiration 28.

Both knee joints are swollen, red, tender and painful. Fluctuation is distinctly present with well-marked riding of the patellæ. No other joints are involved.

The glands in the right axilla are enlarged and palpable, elsewhere they are normal.

Circulatory System.—The pulse is rapid, 120, regular, of small volume and low tension. There is no capillary pulsation. A diffuse cardiac impulse is seen in the 4th and 5th interspaces, the point of maximum intensity being in the 5th space 11 cm. from mid line.

The relative cardiac dullness extends 5.5 cm. to the right and 13.5 cm. to the left of the mid sternal line, and vertically, the dullness extends to the middle of the manubrium sterni.

A presystolic thrill can be definitely palpated at the apex. Here, also a rough presystolic murmur can be heard, followed by a blowing systolic murmur transmitted to the axilla and back. A gallop rhythm is heard just inside of the left nipple line in the 3rd and 4th intercostal spaces.

At the base a diastolic murmur is heard over the aortic cartilage, and transmitted for a short distance down the left side of the sternum. The pulmonary sound is much accentuated.

Urine.—Spec. Grav. 1027, neutral. Albumen present; also a few red blood cells and leucocytes.

The white cell count is 9,360.

Diary.—December 4, 1908.—The pain and tenderness in the knees

have lessened. The temperature has fallen to normal, and the gallop rhythm has almost disappeared. Salicylates have been given, gr. xv, every few hours.

December 8, 1908.—Patient still complains of pain and tenderness in both knees, but the redness and swelling have disappeared. She has a short hacking cough but no sputum. The cardiac dullness has not increased.

Temperature 98-102. Respiration 24-28. Pulse 98-120.

December 11, 1908.—The cardiac dullness extends 4 cm. to the right and 15.5 cm. to the left of the mid-sternal line. The sounds are as before. There is no dullness below the angle of the scapula on the left side; mucous rales are heard all over the chest, and over the area of dullness there are blowing breathing and fine crepitations.

Temperature 97-99. Respiration 26-28. Pulse 108-120.

January 8, 1909.—She has had occasional pain in both elbows and in the left shoulder. There is no dyspnoea. A capillary pulse is now seen in the fingers and lips, and a gallop rhythm is fairly well marked.

Temperature 97-09. Respiration 20-30. Pulse 98-112.

January 15, 1909.—Patient complains of palpitation. This morning she became suddenly blanched and the pulse ran up to 200, the attack passing off in 20 minutes.

February 15, 1909.—During the past month she has had two or three attacks of epistaxis, followed by palpitation and fear of impending death. Latterly the pulse has become feeble and somewhat irregular.

Temperature 97-98. Respiration 30-40. Pulse 100-160.

March 10, 1909.—For the past 10 days the patient has had several synoptic attacks. The pulse has been irregular and the heart sounds weak. The face has been pale, and the lips, fingers and nails cyanosed. There has been marked nausea and vomiting with anorexia.

Patient died after the above note was made. Autopsy performed 1½ hours after death by Dr. MacLachlan.

Anatomical Diagnosis.—Acute and chronic endocarditis; chronic pleuritis; pulmonary congestion; passive congestion of liver and spleen.

Peritoneal Cavity.—There are about 150 cc. of clear straw-coloured fluid, otherwise there is nothing abnormal.

Pleural Cavity.—There are about 80 cc. of slightly turbid fluid in the left side, and each lung is slightly adherent to the diaphragm by a fibrous exudate. The lungs are crepitant throughout, and although there is some congestion of the dependent parts, there is no evidence of pneumonia.

The *Pericardial Cavity* is normal.

Heart.—Weight 375 grms. Both auricles are markedly distended with

blood, the right extending up to the middle of the manubrium sterni. There is considerable hypertrophy of the ventricular walls, the left measuring 2.5 cm. and the right 1 cm. in thickness. The myocardium is of normal colour and of firm consistence. The aortic, mitral and tricuspid valves measure 8 cm., 10 cm., and 11 cm., respectively. Their cusps are considerably sclerosed, and on the former two are a few small recent vegetations. The coronary arteries are normal.

The left shoulder joint contains a small amount of very slightly turbid fluid, but the synovial membranes appear normal.

Bacteriological Report.—Cultures made at autopsy from the heart's blood and the left shoulder joint, reveal the pneumococcus described below.

Case IV.—Clinical Summary.—Growing pains from 9 to 12 years of age. At 12 years of age had chorea. The present illness began with transient hemiplegia. 3rd day, probable broncho-pneumonia. 9th day, arthritis. Death occurred on the 10th day.

G. M. Female. Age 13. Service of Dr. Finley. Was admitted to the General Hospital, March 12, 1909, complaining of pain in the right side of chest, and cough.

Personal History.—She was born in Montreal and has always lived here. At 9 years of age she had measles, and for 3 years afterwards she had "growing pains," but never had a "sore throat" or swelling of the joints.

When 12 years of age she was 10 weeks in the Montreal General Hospital with chorea.

After leaving the hospital she was well for a few months, and then began to have pains in her legs and arms. She went to bed for two weeks, after which she felt better. Later on she was again in bed three weeks with pains in the arms and legs, and for several weeks before the present illness this pain was almost continuous. She perspired profusely at night, but does not think her joints were swollen, and she had no precordial pain.

The present illness began 5 days before admission, when the patient had a transient hemiplegia involving the left arm, the left leg and the right side of the face, lasting about one hour. During this time and the following day she had a severe headache.

Three days after the above onset, she began to have a dry harsh cough. She had a severe chill, lasting 10 minutes, followed by pain in her right side. She perspired profusely. The appetite, however, was good and the bowels regular.

Present Condition.—She is found to be a fairly well developed but

poorly nourished girl of 13 years. The skin and mucous membranes are very anæmic. She can lie comfortably only on her back.

The temperature is 103. Pulse 140. Respiration 42.

The skin is moist, and there is no eruption. The finger nails are clubbed. There is no pain, tenderness or swelling in any of the joints at present.

There are no glandular enlargements.

Circulatory System.—The pulse is rapid, 138, regular, full and bounding, but the vessel wall is soft. There is no præcordial pain and no palpitation.

The apex impulse is seen and felt in the 5th space 11.5 cm. to the left of the mid-sternal line, and the cardiac dullness extends 4 cm. to the right and 12 cm. to the left of the mid-sternal line at the 5th rib. A well-marked presystolic thrill is felt at the apex, where, on auscultation, the first sound is preceded by a rumbling noise, and is accompanied by a soft systolic murmur transmitted to the axilla. At the aortic cartilage there is a loud, rough murmur accompanying the first sound and transmitted upwards into the neck. The pulmonary second sound is accentuated.

Respiratory System.—There is dyspnoea on exertion, and a dry cough but no expectoration. The thorax is well formed, and the expansion is good. There is some pain, on coughing, in the right infraclavicular region. On percussion, the lungs are resonant throughout, and the breathing vesicular, except for a few crepitant rales over the right apex posteriorly.

The urine is normal except for slight diminution of chlorides.

The white cells count is 17,800.

Diary.—March 17, 1909.—In spite of stimulation the patient has gradually become weaker since admission. The temperature has gradually dropped from 101½ to 100. The pulse, which ran from 130 to 148, has been imperceptible at the wrist for the last 24 hours. Respiration 40-56. The extremities are cyanosed, and there is marked dyspnoea and orthopnoea. During the last two days she has complained of pain in her left shoulder, but there is neither redness nor swelling.

Shortly after the above note the temperature suddenly dropped to 95, followed by death.

Autopsy performed 7½ hours after death.

Anatomical Diagnosis.—Acute and chronic endocarditis; chronic pericarditis; acute nephritis; broncho-pneumonia; acute and chronic pleuritis; thrombosis and aneurysm of the right internal iliac artery; infarction of the spleen.

Peritoneal Cavity.—Normal.

Pleural Cavity.—The left side contains 500 c.c. of turbid blood-stained fluid. The right lung is adherent by a few old fibrous bands, and there is a patch of yellowish fibrinous exudate over the anterior surface of the middle lobe of the same organ.

Lungs.—The middle lobe of the right lung is but slightly crepitant, and firm nodules can be felt in its substance. On section, it is of a mottled red colour, and from the firm areas a brownish muco-pus can be expressed, containing Gram-positive encapsulated diplococci.

The *Pericardial Cavity* contains about 150 cc. of clear straw-coloured fluid. The pericardium is smooth and glistening throughout, except for a whitish roughened area 5 cm. in diameter on the anterior surface of the right ventricle near the apex, and to which are attached a few white fibrous shreds. An area corresponding to this is seen on the parietal pericardium.

Heart.—Weight 445 grms. The myocardium is of a pale red colour, but of firm consistence. The mitral valve measures 7.5 cm. It is considerably sclerosed, and to the posterior cusp is attached a whitish fibrous vegetation, almost spherical in shape, and about .5 cm. in diameter. The aortic valve measures 6 cm. On its cusps are exuberant, whitish coloured, cauliflower-like vegetations, forming an almost continuous mass about 1 cm. in diameter around the valvular orifice, and over these are scattered many small reddish coloured granular areas. The ventricular walls are considerably hypertrophied, the left measuring 2 cm. and the right .75 cm.

There is an aneurysmal dilatation of the anterior wall of the right internal iliac artery 2 x 2 x 4 cm. This is filled with lamellated clot which almost occludes the lumen of the vessel.

Spleen.—Weight 250 grms. On section, there is an area at the lower pole of the organ, about 5 cm. in diameter, grayish in colour and of very friable consistence. Elsewhere the organ is firm and of dark red colour.

Kidneys.—Weight 300 grms. The organs are slightly congested and, microscopically, the cells of the convoluted tubules contain a considerable amount of fat.

The left shoulder joint shows nothing abnormal. The small amount of fluid present is apparently clear.

Bacteriological Report.—A blood culture taken on the 7th day of her present illness, and cultures made at autopsy from the heart's blood and the left shoulder joint, revealed the pneumococcus.

No culture was made from the lung.

Case V.—Clinical Summary.—At 5 years of age she had scarlet fever.

and at 15 years acute rheumatism. Present illness began with dyspnoea and oedema. Soreness of joints about the 34th day. Apparent onset of pneumonia about the 40th day. Death 43rd day.

M. O. Age 40. Female. Service of Dr. Finley. Was admitted to the General Hospital November 19, 1909, complaining of sore throat, dyspnoea, weakness and headache.

Personal History.—She was born in Canada and had always lived here. She was married at 23 years of age, had 4 children; one died at 2 years of age, and the others soon after birth, of unknown causes. She had no miscarriages. Menstruation has always been normal. When 5 years of age she had scarlet fever, whooping cough and measles. At 15 years of age she was in bed 7 weeks with pain, redness, tenderness and swelling of both ankle joints.

The present illness began about one month before admission, with pains in her head, in her back and over the præcordium. She coughed a good deal, but had no expectoration.

For the first time now she noticed she had dyspnoea on exertion and occasionally orthopnoea, but was not confined to bed. Since the onset she has noticed that her feet were swollen at night. These symptoms gradually became more severe until admission.

Present Condition.—The patient is a moderately nourished woman. The face is pale and the cheeks somewhat cyanosed. The respiration is rapid, and there is well-marked orthopnoea.

Circulatory System.—The pulse is somewhat collapsing, but not increased in volume, and there is well-marked capillary pulsation in the lips and finger nails.

There is a forcible cardiac impulse in the 3rd, 4th and 5th left intercostal spaces. The cardiac dullness extends up under the manubrium sterni. 6.5 cm. to the right and 12 cm. to the left of the mid-sternal line at the 4th rib.

At the apex both sounds are indistinct. The first is preceded by a faint rumble and accompanied by a soft blowing murmur not transmitted to the axilla. At the base of the heart the aortic sound is partly obliterated by a soft diastolic murmur transmitted down to the left side of the sternum. Here, also, there is a soft systolic murmur, best heard on the right side of the sternum over the 3rd rib. The pulmonary sound is accentuated.

Respiratory System.—The respirations are rapid, laboured, and accompanied by dilation of the *alæ nasi* with contraction of the muscles of the neck.

The pulmonary resonance extends to the 4th space on the right and to

the 3rd space on the left, anteriorly. Posteriorly, there is dullness below the angle of the scapula on the right side and below the 9th rib on the left. Rhonchi are heard all over the chest, and a few coarse crepitations are heard at the bases of the lungs.

Digestive System.—The tongue is dry and coated. The abdomen is soft and not tender. The liver dullness extends from the 4th rib to the left of the umbilicus, measuring 23 cm. in the right nipple line.

The feet are cold and there is marked œdema of the ankles and legs, extending up into the thighs.

The urine shows the following:—

Sp. Gr. 1,030, acid, clear, amber. There is a trace of albumen and a few granular casts.

Blood count shows:—

Red cells	3,150,000
White cells	7,800
Hæmoglobin	67%

Temperature 99.3. Pulse 120. Respiration 24.

Diary.—November 22.—For the last three days the patient has been kept in bed and given digitalis. The dyspnœa and orthopnœa have become much less, and the œdema has decreased considerably. The circulatory and respiratory systems are the same as before. She complains of soreness of her knees and shoulder joints, but there is no redness and no swelling.

Temperature 101½. Pulse 96. Respiration 28.

November 29.—The temperature, which has been intermitting between 95 and 98 for 6 days suddenly rose yesterday to 102 where it has remained. The pulse is now 112 and the respiration 48. The dyspnœa is more marked, but there is little cyanosis of the lips, cheeks or fingers. Her mental condition is dull. Large moist rales can be heard all over the chest. A paracentesis was done yesterday in the lower axilla and 100 c.c. of blood-stained fluid withdrawn. There is no friction rub or blowing breathing. The cardiac dullness and sounds are unchanged. The spleen can just be felt under the costal border. No definite dullness can be made out in the flanks.

December 1, 1909.—The temperature has remained about 102. Respiration 64. Pulse 112. The breathing is now very laboured, with dilation of the alæ nasi and contraction of the muscles of the neck. There is dullness, blowing breathing, increased fremitus, and fine crepitations over the upper lobe of the left lung.

December 2, 1909.—Patient gradually sank since last note and died.

Autopsy performed 19 hours after death by Drs. Baird and MacLachlan.

Anatomical Diagnosis.—Cardiac hypertrophy; acute and chronic endocarditis; arterio-sclerosis; broncho-pneumonia; hydrothorax; ascites; chronic passive congestion of liver and spleen; acute septic leptomeningitis.

Peritoneal Cavity.—There are about 150 cc. of clear straw-coloured fluid. The peritoneum is smooth and glistening. The liver almost fills the right half of the abdominal cavity, the right lobe being elongated and its lower edge lying 2.5 cm. below the right iliac crest. The lower edge of the left lobe lies 6 cm. below the costal margin.

Pleural Cavity.—There are about 350 cc. of clear straw-coloured fluid in the right side. No adhesions.

The right lung and the lower lobe of the left are crepitant throughout. On section, they are slightly congested. The upper lobe of the left lung is but slightly crepitant and is nodular. On section, it is of a dark red colour, mottled with grayish areas, having a somewhat dry, granular surface, from which plugs of thick pus can be expressed containing Gram-positive encapsulated diplococci.

Pericardial Cavity.—Normal.

Heart.—Weight 415 grms. The right auricle is distended with blood. The myocardium is of dark red colour and of firm consistence. The left ventricle shows considerable hypertrophy, measuring 1.75 cm. in thickness. The mitral valve is markedly sclerosed and measures only 6.5 cm. The aortic valve measures 5 cm. Its cusps are considerably thickened and adherent at their edges. In the right posterior cusp there is a perforation measuring .5 cm. in diameter and having ulcerated edges. On the free edges of the cusp there is a large, reddish-coloured, fibrous vegetation 1 cm. in diameter. The coronary arteries show considerable atheroma.

Spleen.—Weight 205 grms. On section, the organ is of a dark red colour and of firm consistence. The structure is easily made out.

Liver.—Weight 1,790 grms. The right lobe is elongated, measuring 27 cm. from above downwards. On section, the organ is of a dark brown colour, finely mottled with yellow, and of firm consistence. The organs of the neck, the gastro-intestinal tract, pancreas, kidneys, adrenals, bladder and genitalia show nothing abnormal. The aorta shows occasional atheromatous plaques throughout its extent.

Head.—The calvarium measures .75 cm. in thickness. The dura is considerably thickened and dense. The brain weighs 1,350 grms. Over the vertex there is considerable sub-pial oedema, and many of the sulci

contain a small amount of yellowish exudate. Over the base and especially in the region of the pons, there is a well-marked layer of greenish yellow pus. The ventricles are not distended, and there is no softening.

In this case no joints were opened.

Spinal Cord.—There are several small areas of yellowish purulent exudate in the arachnoid space similar to that in the base of the brain.

Bacteriological Report.—A blood culture taken four days before death, at the rise of temperature above stated, revealed the pneumococcus. Smears from the exudate over the brain and cord showed a Gram-positive encapsulated diplococcus, and cultures made from the heart's blood and the brain revealed the same organism.

Cultures from the pleural fluid were negative.

In reviewing the bacteriological reports we find that in only cases 4 and 5 were the organisms found in blood cultures taken before death. In all it was isolated from the heart's blood after death. In the first four cases it was found in the fluid from the last affected joint. In cases 1 and 2 it was obtained from the pericardium; in case 1 from the myocardium, and in case 5 from the exudate over the brain and cord.

In each case the procedure for making cultures was the same. In taking the blood cultures the needle was inserted into the median basilic or cephalic vein and 4 to 6 c.c. withdrawn. At the autopsies the heart's blood was obtained by inserting a sterile pipette into the seared auricle.

In all the cases flasks containing about 50 cc. of plain bouillon, inulin bouillon, and litmus milk, and tubes containing blood agar and blood serum, were inoculated with a few drops of blood. Likewise, tubes and flasks were inoculated as far as was possible, at autopsy, from the other above named sources. Morphologically, the organism isolated from these various cases is a Gram-positive, oval-shaped coccus measuring about one micron in its long diameter. It is for the most part arranged in pairs, but in fluid media it often occurs in chains of from four to ten or twelve, and in many of the primary milk cultures it has shown a well defined capsule.

In cultures the more profuse growths are obtained by the use of slightly acid or neutral culture media. There is no growth on plain agar. Gelatin is not liquified, and there is no evidence of motility. On blood agar plates it grows in small, transparent, well-defined colonies and produces a slight hæmolysis, giving the medium a somewhat greenish tint. In bouillon it produces a turbidity which settles to the bottom as a grayish sediment.

Dextrose and lactose are fermented, but not mannite or saccharose. In

litmus milk it produces acid, giving the medium a beautiful pink colour, and furthermore, it raises the acidity of inulin bouillon 2 to 3 per cent.

The organism is devitalized at 55 degrees for one hour, but cultures kept in an ice chest only require transplantation every four or five weeks, and on one occasion transplants made on blood agar from a bouillon flask standing six weeks in room temperature gave a profuse growth.

Exactly similar animal inoculations were carried out in the first four cases. Three days after the organisms were isolated, a rabbit and a guinea pig were inoculated intra-peritoneally with 2 c.c. of a turbid broth culture of 24 hours incubation. This produced no abnormal symptoms. 4 c.c. of a similar culture were then injected directly into the ear vein of a rabbit. This animal ate well, was active, and showed no evidence of articular or cardiac disturbances. The washings from six blood agar tubes were then injected into the ear vein of a fresh rabbit. In each case this animal showed a marked indisposition for two or three days and remained quiet except when forced to move in the open. The condition then began to improve, and in from eight to ten days it was almost well. Each animal was then killed, and autopsies revealed no cardiac or articular disturbances. Blood smears, however, showed a marked leucocytosis, and in three cases the organism was recovered in cultures made from the heart's blood.

Rabbits inoculated intravenously with 10 cc. from a devitalized broth culture reveal no toxic symptoms.

Three days after the organism was isolated in case 5, a rabbit was inoculated intravenously with the washings from three blood serum tubes, but this animal did not show the slightest indisposition during the following five weeks, at the end of which time it passed from under observation. A white mouse inoculated at the same time with the washings from one blood serum tube died in 24 hours, and smears from its blood showed innumerable Gram-positive encapsulated diplococci. Four other white mice inoculated with equal amounts of transplants from cultures of the first four cases did not die, but when killed, after 36 hours, the organism were recovered from the heart's blood of the animals inoculated with the cultures isolated in cases 1 and 4.

The fact that the old cultures were less pathogenic to the white mice can probably be explained by their being grown for a longer period of time on artificial culture media.

No attempt was made to raise the virulence of the organism in any case.

On reviewing the literature of acute rheumatism and chorea, there would seem to be very little doubt that the condition is bacterial in origin,

but as to whether there is a specific organism or a number of organisms which may set up the condition does not seem to be definitely settled. The organism described above corresponds very closely, morphologically and in cultural characteristics, to that described by Poynton and Paine. Their organism, however, possessed considerable virulence for rabbits.

From bacteriological observations made on the cases here reported, and on several non-fatal cases in the wards, it would appear that the disease was due to an organism of low virulence, which produces an arthritis from which it cannot easily be isolated, but that the virulence may increase so as to produce cardiac and pulmonary lesions and even death.

	Clinical History.	Temperature.	Pulse.	Respiration.	White cells.	Source of Culture.	Organism.
Case 1. Age 16 Female	Onset with polyarthritis Pericarditis on 5th day Pleuritis " 6th " Death " 9th "	96-103	112-140	32-46	16,200	Heart's blood Shoulder joint Myocardium Pericardium	Pneumococcus
Case 2. Age 16 Female	Acute rheumatism at 7, 11, and 12 years of age Present onset with arthritis Lobar pneumonia on 2nd day Endocarditis " 2nd " Death " 10th "	98-103	116-136	34-52	17,000	Heart's blood Pericardium Left ankle joint	Pneumococcus
Case 3. Age 14 Female	Acute rheumatism at 13 years Present onset with arthritis Pleurisy on 9th day Endocarditis " 37th " Death " 101st	96-102½	72-148	22-48	9,600	Heart's blood Left shoulder joint	Pneumococcus
Case 4. Age 14 Female	Growing pains in childhood Chorea at 12 years of age Present onset with hemiplegia Broncho-pneumonia 3rd day Arthritis " 9th " Death " 10th "	101-104½	124-138	36-54	17,500	Blood culture 7th day Heart's blood Left shoulder joint	Pneumococcus
Case 5. Age 30 Female	Acute rheumatism at 15 years Present onset with dyspnoea Arthritis " 34th day Broncho-pneumonia 40th " Death " 43rd "	95-102½	72-124	20-52	7,800	Blood culture 40th day Heart's blood Meninges.	Pneumococcus

By way of illustration, a few cases may be mentioned briefly:—

A boy, 12 years of age, admitted with well-marked chorea and endocarditis; following this he developed pericarditis, hemiplegia lasting one week, and later pleurisy with effusion. Cultures made from the pleural fluid showed Gram-positive diplococci resembling, as far as they could be cultivated, those found in the fatal cases described above, but they failed to grow on the second transplant.

In 8 out of 13 adult cases of typical acute rheumatic fever, smears made from the fluid aspirated from the affected joints revealed pus cells and occasional Gram-positive encapsulated diplococci, but no growths could be obtained in cultures made.

In the five other cases, one of which developed endocarditis, pericarditis and pleurisy, the aspirated fluid contained many pus cells, but no bacteria could be found and cultures were sterile.

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SOME THEORIES ON THE NATURE OF SHOCK.

BY

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Theories regarding the nature of shock have been many and various, especially during the past half century, but for the scope of this paper, only such theories are considered as have a foundation built upon experimentation.

For many years before the present era of experimental shock, the cause of shock was vaguely ascribed to the severe shaking up or commotion of the vital processes. For example, Erichsen, in 1864, considered shock, especially in accidents, to be due to the "sharp vibration that is transmitted through everything." It is, however, worthy of note that as early as 1864, W. W. Keen and S. Weir Mitchell put forth practically the same theory as that advanced by Crile, of Cleveland, at the present day, namely, that shock was due to vasomotor fatigue.

The era of experimentation might properly be said to have begun about 1870. It was in this year that Golz, of Strassburg, began his classical experiments on frogs. His findings, of interest to us in this paper, were briefly these: When a frog is suspended, with legs downwards, and

sharply tapped on the abdomen with the handle of a scalpel, the heart is suddenly arrested; after a short time it resumes its beat but is paler, and less blood is thrown out at each contraction, and the blood is seen to collect in the splanchnic area. On placing the frog in the horizontal position the heart soon acquires its normal colour and the normal amount of blood again passes through it. This experiment furnished a foundation for much experimental work, and its principle is embodied in a widely accepted, present-day theory.

Fischer, interpreting Golz's experiments, advanced the theory that shock was a vaso-motor paralysis of the splanchnic area, with the result that most of the blood of the body accumulated there. Briefly put: Shock was a hæmorrhage into the great veins of the body. To Fischer the vascular disturbance was primary, the secondary disturbances being accounted for by anæmia of the parts outside the splanchnic area. Fischer, writing on shock nearly forty years ago, cites a concrete case of shock which gives a very clear and definite clinical picture: "A strong and perfectly healthy young man was struck in the abdomen by the pole of a carriage drawn by runaway horses. No recognizable injury was done to any internal organs, nevertheless grave symptoms made their appearance immediately after the accident. The injured man was lying perfectly quiet and paid no attention to anything going on around him. His face was drawn and peculiarly elongated, the forehead wrinkled, and the nostrils dilated. His weary, lustreless eyes were deeply sunk in their sockets, half covered by the drooping eyelids. The pupils were dilated and reacted sluggishly to light. The eyes had a glassy and vacant expression. The skin and mucous membrane had a glossy and marble-like pallor; large drops of sweat hung on eyebrows and forehead. The rectal temperature was subnormal; the sensibility of the entire body was greatly reduced; the patient reacted slightly and only to very painful impressions. No spontaneous movements of any sort were made by the patient. On repeated and urgent requests he showed that he could execute limited brief movements; the sphincters were intact, the urine obtained by catheter was scanty and concentrated, but otherwise normal. The almost imperceptible pulse was rapid, irregular and unequal. The arteries were narrow and of low tension. The patient answered questions slowly and only after repeated questioning. His voice was hoarse and weak. On being repeatedly questioned he complained of cold, faintness, and deadness of all parts of the body. The respirations appeared irregular, and when he shut his eyes he felt nauseated and dizzy."

This syndrome is that of a case of traumatic shock, but it fits very well those cases of surgical shock, excepting that the latter is more slowly

developed. To many minds shock has come to be associated in a restrictive manner with surgical shock alone. This is no doubt due largely to the labours of Crile in directing attention to the nature and prevention of surgical shock.

Working along the lines suggested by Golz's experiments on frogs that the vascular phenomenon is the primary cause of shock, Crile has attempted by careful and extensive experimentation to solve the problem of surgical shock. His experiments have been carried out principally on dogs. Blood pressure was, in each experiment, carefully noted with mercury, and sometimes, both mercury and water manometers. Various procedures for reducing the animal to shock were resorted to, as, laparotomy, crushing and tearing of various organs and members, extensive dissection of skin and tissues, pulling and tearing of viscera and peritoneum, removal of portions of the brain, burns, and gun-shot wounds. In most of these procedures there was noted a preliminary rise in blood pressure, but continued manipulation was followed by gradual decline of blood pressure and, in proportion to the rapidity and amount of fall of blood pressure, the different stages of shock appeared. Usually in advanced shock stimulation of an afferent nerve, such as the sciatic, resulted in no vaso-motor response. Procedures such as section of the spermatic cord, crushing or mechanical violence to the testicles and ovaries, resulted in a fall of blood pressure from the beginning.

Crile's conclusions are essentially as follows: Mixed nerves contain pressor and depressor fibres; stimulation normally calls into effect pressor action and blood pressure is raised. Continued and especially severe stimulation exhausts the pressor effects and the depressor action is called into effect with a consequent fall of blood pressure. The depth of shock is in proportion to the failure of the pressor action. This places the failure of blood pressure as the principal cause of shock, and this failure of blood pressure has as its cause vaso-motor exhaustion. Cardiac and respiratory failure are factors in the causation of shock, but are only of secondary consequence.

As a support to his contention of vaso-motor exhaustion, Crile has shown that if the afferent nerve paths from the field of operation are blocked by cocaine, and severe afferent impulses thus prevented from passing centripetally, the vaso-motor centre continues to function well and blood pressure is maintained. Adrenalin will provide a temporary pressor mechanism by contracting the muscle in the walls of the blood vessels. Also transfusion of blood and peripheral pressure, maintained by means of a pneumatic suit encasing the patient, will raise blood pressure by hydraulic principles; such rise is only temporary, where shock

has proceeded far, and will not be long sustained on account of the complete exhaustion of the vaso-motor centre.

In a set of recently published experiments, Crile claims to have found constant alterations present in shock, in the perkinje cells in the cerebella of dogs. He observed an initial increase in the extra- and intranuclear chromatic material of the Nissl substance. This increase was followed by a progressive decrease and final disappearance. There were also present structural changes in the cell. "The cytoplasm became oedematous and vacuolated, leading to general disintegration of the reticulum, in which degeneration the nucleus shares."

Distinction between shock and the allied phenomenon, collapse. The

An important phase in Crile's work is that he makes the following onset of shock is gradual, and of vaso-motor origin primarily. Collapse has a sudden onset and may have its origin in cardiac, respiratory or vaso-motor inhibition of function. In shock the vaso-motor centre is exhausted and stimulants simply hasten the end. In collapse the centre is "functionally depressed," and stimulants are indicated. The necessity of carefully distinguishing between the two conditions is only too obvious.

Porter does not accept Crile's conclusions, and states that an analysis of 765 blood pressure records, taken from stimulation of the sciatic, brachial and depressor nerves of different animals, shows "that the percentage change in blood pressure, which is the true index of the condition of the vaso-motor cells, increases as the blood pressure falls." Where all the clinical signs of shock were present, blood pressure low, temperature sub-normal, heart beat weak and irregular, and the irritability of the nervous system much reduced, stimulation of the depressor nerve lowered blood pressure 45 per cent. This data, he says, shows pretty conclusively that the vaso-motor cells in shock are neither exhausted, inhibited nor depressed. In explanation of Crile's findings on blood pressure, Porter says: "Exposure of the intestines inevitably dilates the blood vessels in the largest vascular area in the body. The general blood pressure thereupon necessarily falls. Primarily, this is simply an hydrostatic phenomenon identical with the fall in arterial pressure produced in a rubber and glass model of the circulation, by lessening the peripheral resistance." He further points out that removal of large portions of skin acts in the same manner by dilatation of the vessels in the area with a consequent fall in the general pressure. "The escape of blood from the arterial and their capillary terminals either outside the body or into the veins produces not merely an hydrostatic fall in the general blood pressure, but if the dislocation be excessive, deprives the bulbar cells of oxygen by removing large quantities of hæmoglobin."

This brings us to the consideration of another theory where, instead of oxygen starvation too much oxygen or fresh air, replacing the CO_2 of the tissues, contributes markedly to the condition of shock. This theory is propounded by Henderson, of Yale, who believes that acapnia, which means diminished CO_2 content of the blood and tissues, is an important factor in the production of shock. His conclusion, drawn from experiments on dogs, may be summarized as follows: There is accumulating evidence that CO_2 acts as a hormone and the CO_2 content of the blood, if diminished, affects the heart, respiration, nervous system, and circulation. Sudden or relatively great diminution in the CO_2 content of the arterial blood, probably by affecting centres in the medulla, increased the heart rate up to the point of cardiac tetanus, and death resulted. Less sudden diminution, either by hypernœa (the effect of administration of an anæsthetic, or severe afferent impulses), or exhalation of CO_2 from exposed viscera, in operations, may produce the condition of surgical shock. He points out that even voluntary rapid respirations, by altering the CO_2 content of the lungs, will give rise to very rapid heart beats with fall of blood pressure. Experiments are now under way to determine the value of CO_2 inhalations in shock, and of intravenous salines saturated with CO_2 . To Henderson, the control of the heart is control of the situation in shock. By regulating the rate of pulmonary ventilation he reduced the heart beat, approximately from 155 to 30; in fact, he adjusted the heart beat to any desired rate. As long as the heart beat was slow, or moderate, shock was held in abeyance.

Howell regards the heart as an important factor in shock, but he distinguishes two forms of shock, cardiac and vascular. In some of his experiments he noted the pulse was very rapid and weak, while the blood pressure was fairly well maintained. In other experiments the blood pressure dropped to 40 or 20 millimeters of mercury. The pulse in these cases was greatly accelerated. He concludes that cardiac shock may occur without the fall in blood pressure, but vascular shock is always accompanied by cardiac failure. Howell considers that there is no evidence of exhaustion of the cardio-inhibitory or vaso-motor centres, as there were no signs of a preceding over-excitation. He assigns the cause to an inhibition of the tonus of the vagus, which causes acceleration of the heart and an inhibition of the vaso-motor centres leading to vascular shock.

Another very able exponent of inhibition as the cause of shock, is S J. Meltzer, whose views, however, do not entirely coincide with those of Howell. Meltzer has formulated a theory which takes into account those

cases of sudden traumatic shock as well as surgical shock. He believes that accidental injuries, violent mechanical agitation of sensitive parts, laparotomies, burns, and extensive destruction of tissue react on the nervous system as a whole, not on a few centres, "producing a marked tendency towards inhibition of functions." He cites as an example, opening the abdominal cavity, with extensive exposure of viscera, resulting in insensibility of the viscera, general insensibility and apathy, and general muscular weakness. If rough handling of the viscera is kept up varying degrees of shock appear, according to the resistance of the subject; ultimately complete shock develops. The vital processes are involved, but in varying degrees and not in the same order. Sometimes the heart is primarily involved, at other times the respiratory or vascular systems are the first to fail. To quote from one of Meltzer's articles: "The assumption that the insufficient activity of several functions during shock is due to a preponderating inhibitory influence refers only to the primary effect. It seems to me self-evident that during the course of shock other influences must become secondarily active. The insufficient activity of one function becomes detrimental to the other, and anæmia, asphyxia, and even fatigue or other conditions, might become operative during the course of shock."

Lemon, writing in the *Yale Medical Journal*, agrees with Meltzer's views regarding shock as a reflex inhibition of the nervous system, but he makes a point of the fact that shock, of the milder types, has, seemingly, escaped attention. He draws a clinical picture of a case of shock of a type which usually goes unrecognized: "A man of middle age and nervous temperament has been thrown violently to the floor, in a collision of cars. There is no demonstrable physical injury; the patient assures us that he is not injured, and seems anxious to get away from the scene of the accident. He talks rapidly, is in a very affable mood, and congratulates himself on his escape. We follow that man to his home, and an hour later a different picture presents itself. The man is quiet, the exaltation of mind has disappeared, the pulse is rapid, and he is overtaken by a feeling of fatigue. Reaction begins, he becomes conscious of pain at various parts of his body; he is nauseated; the extremities are cold, though not bathed in perspiration. If the accident has followed shortly after the ingestion of a meal, he vomits. Six hours later there is a slight rise of temperature, and the patient has a restless night. The following day the tongue is coated, there is headache, the face is flushed and may appear swollen; there is complete loss of appetite. pain in the small of the back. The patient is irritable, he is anxious about his business affairs, and almost without exception his bowels fail

to move. The assurance of the previous day that he was not injured gives place to a despondent fear that he is seriously injured and that his condition will become progressively worse." Lemon explains the condition just recounted as due to a reflex inhibition of the nervous system, causing not only vaso-motor and heart disturbances, but arrest of function of the physiological processes taking place in the body. He adds that in no other way could one explain the nausea, restlessness, muscular soreness, disordered digestion, pains and prostration, following a comparatively trivial injury.

Bainbridge and Parkinson, in England, at two autopsies for post-operative shock, noted the absence of chromoffin tissue in the suprarenal glands. This opens up a new field for experimental shock and suggests an interesting possibility as a help in solving the true nature of shock. Schur and Weisel, working in Germany, have noted the same loss of chromoffin tissue in the suprarenals, but attribute it to the administration of volatile anæsthetics.

In summing up the status of shock at present, as evolved from the various experimental findings, Crile's work and conclusions cannot fail to appeal to one, from a practical standpoint. His conclusions have all been tested in his extensive surgical practice. His pneumatic suit, which by various degrees of inflation, maintains the peripheral pressure by mechanical means, when the true vaso-motor mechanism gives way, has tided many patients over a dangerous crisis. Transfusion of blood he regards as almost a specific in preventing shock in patients, who, otherwise, would be "very poor surgical risks."

Porter's conclusions are entirely opposed to Crile's findings. His experimental evidence, in support of his contention that the vaso-motor cells are not exhausted in shock, is very strong. His vast experience in research work would presuppose a correct interpretation of his results, yet, withal, his conclusions do not seem to have led to the formation of a theory as to the true cause of shock, nor to any methods for the prevention of shock.

Henderson's theory of acopnia, or diminished CO_2 content of the tissues as a factor in shock, does not attempt to controvert any experimental findings so far published. The theory simply suggests that the possibility of many factors contributing to the condition known as shock, and it seems to have opened up new territory properly belonging to the domain of shock.

We have covered in a brief manner most of the present-day theories on shock that have as a basis experimental evidence. Certainly, the sign posts do not all point in the same direction, and some of the conclusions

would seem rather to lead us afield than otherwise. However, many of the experimental findings agree with clinical observations, and such evidence must be regarded as of the highest worth. Meltzer fixed the status of shock pretty well when he said: "The bringing forward of new experimental facts capable of shedding some more light on our puzzling problem is not yet a superfluous luxury."

ACCIDENTAL DIVISION OF URETER WITH END-TO-END ANASTOMOSIS.

BY

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Mrs. H., aged 28, was referred to me by Dr. Foss, of Black Lake, September, 1909, for operation.

On opening the abdomen there presented a large multilocular cyst, the size of a foetal head, situated between the layers of the broad ligament on the right side. There were extensive adhesions to the pelvic brim and surrounding structures. The cæcum was freed by the removal of the appendix. A considerable portion of the ileum was detached from the mass by leaving a portion of the cyst well attached to the bowel. In the attempt to free the adhesions from the pelvic brim, with round pointed scissors, the ureter was divided completely. This was at a point one inch internal to its natural course. It was firmly adherent to the thick cyst wall. The ureter was dissected back for $\frac{3}{8}$ of an inch in each direction, then tension sutures placed in the masses on either side, and drawn up, thus relieving all strain on the ureter. An end-to-end anastomosis was then done, using two interrupted sutures of fine silk on either side of the ureter, which was held by my assistant, while a fine continuous suture of the same material was lightly applied around the line of division passing through all the coats except the mucosa.

The patient made an uneventful recovery, and has had absolutely no trouble referable to the pelvic or renal regions up to the present, September 10th, 1910. The point in the ureter where the division was made, and the existing complications made it impossible to do either of two other preferable procedures, viz., implantation into the bladder wall or lateral ureteral implantation.

ANÆSTHESIA—THE PSYCHOLOGICAL BUGBEAR OF SURGERY.

BY

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Some years ago, whilst reading Dr. Wm. Osler's "Science and Immortality," I came across one of Oliver Wendell Holmes's many apt sayings, "We may love the mystical and talk much of the shadows, but when it comes to going out among them and laying hold of them with the hand of faith, we are not of the excursion;" and it struck me at the time that there was no better illustration of the truth of this statement than the manner in which the average individual regarded "crossing the bar" of anæsthetic oblivion. Truly, of all the intricacies of the human mind, there is, perhaps, no more interesting phase than that which comes under the observation of the anæsthetist.

Dr. Osler, in describing his five hundred death-bed scenes, states that the great majority showed no mental apprehension, in fact, "gave no sign one way or the other."

On the other hand, observations extending over thrice that number of cases for anæsthesia, justify me in making the assertion that the overwhelming majority have shown mental apprehension, and indeed, in some cases, anguish, when called upon to experience what may, in so far as the conscious mind is concerned, be termed the temporary death of anæsthesia.

It may seem absurd to make such a comparison, but if we accept Dr. Osler's conclusions, why do the vast majority approach the Great Divide without any apparent qualms, and yet when it comes to the induction of anæsthesia, which does not involve any more risk than say a "railroad journey," mankind in general is assailed by a thousand fears? Why is it that one, after considerable experience, is apt to marvel at the stoicism of an individual who approaches the shrine of anæsthesia without fear and trembling, even as the mighty Achilles marvelled at the composure with which the still living Ulysses, during the course of his visit to Hades, wandered, without divine escort, among the scenes of preternatural terror, at which a living Achilles might have shuddered?"

I suppose the explanation lies in the fact that in the case of death, the soul does not wrench itself violently from the body—the conscious mind is not blotted out instantaneously like the dropping of a lid on a box; in other words, the last end represents the culmination of the

inevitable—one is not called upon to make the decision, in the same way as Aeneas or Ulysses were called upon to visit Hades, or as the individual is ordinarily called upon to undergo the process of anæsthesia.

“Even when great pain has been suffered in the last struggle for life, when Death finally claims his victim for his own, he mercifully lulls him into insensibility or indifference. Whatever fear of the unknown there may previously have been seems to pass away with the ebbing tide of life.”

But while during the early moments of anæsthetization, it may seem as if “one were carried for the moment out of the body” (some individuals will tell you they felt as if they were going “down, down, down,” until they struck nothingness with a bang), it is not a merciful ebbing of an already dulled spirit, but on the contrary, the more or less instantaneous and disagreeable blotting out of an intensely vivid consciousness.

Occasionally something of the sort is experienced by sufferers from insomnia; sleep is coaxed with difficulty, and yet when the actual moment draws near for “dropping off” into the long sighed-for and yawned-for state, a hesitating halting feeling somewhat akin to fear is experienced, for here, too, there is an abnormal perception of the transition between wakefulness and sleep.

In 1876, Dr. Bigelow, of Boston, in concluding an address, said:

“There is hardly an inhabitant of the civilized world but can remember some one of those nearest to him in whose experience the anguish of the knife or of disease, of birth or of death, has been assuaged by anæsthesia, perhaps converted into a pleasant dream.”

Surely, such a statement can be made to-day with added positiveness, if such were necessary; and yet I venture to assert that anæsthesia is the psychological bugbear of the surgical world to-day. This is suggested, too, by the fact that in New York, in recent years, a large number of operations, including herniotomies, have been performed under local anæsthesia, while spinal anæsthesia has been much discussed and experimented upon. In London the spectacular sight has been observed of a patient having his leg amputated (at one end) while he enjoyed a cup of tea (at the other). Surely, tea may, in such a case, be said to be the panacea of all evil!

Nowadays, the patient allows the “knife” to enter but slightly into his pre-operative ideas; the sum-total of any surgical procedure is expressed by five letters which loom up in his mind as large as the top-most letters of Snellen’s Test Types and make up the appalling word “ETHER.”

“Just as one man, before consciousness is utterly abolished, sings,

while another swears, and a third confesses his sins," so some would-be connoisseurs will say they "dread the ether" because of the initial choking sensation or the after vomiting, if they have already had the experience; others will tell you they fear they will not come out of it alive, which latter apprehension is limited, in great part, to patients undergoing the process for the first time, but over and above these cases there are many who cannot or will not give adequate reasons for dreading it, and whose fears are mixed up with such a feeling of indefiniteness, that I have come to the conclusion that it is due to the approaching loss of consciousness and to the "anæsthetic shadows" which loom up in the patient's mind when faced with temporary self-effacement. Moreover, mingled with their vaguer apprehensions, is the undercurrent that they are about to undergo a very unpleasant experience.

And it is no light matter, this giving up of one's intensely conscious mind, even for a short period, in this age of mental tension; and without desiring to prophesy, it seems to me that the process will become harder as time goes on, unless there is a radical change in the civilized tendencies of the present time. The prospect of etherization makes strong men turn pale, and who knows that if Julius Cæsar had been obliged to undergo the sensation, he might not have uttered his famous words regarding fear:

"Cowards die many times before their death,
 "The valiant never taste of death but once;
 "Of all the wonders I yet have heard
 "It seems to me most strange that men should fear
 "Seeing that death, a necessary end,
 "Will come when it will come."

That it is not due merely to any awesome conception of surgery in general in the lay mind is shown by the fact that even a physician's philosophy and science are inclined to waiver at the prospect of having the ether cone applied to his Hippocratic nostrils; but here the materialism of the average medical mind is shown by the fact that his fear is of an eminently practical nature, and may be summed up as follows:

- I. Failure of circulation.
- II. Failure of respiration.
- III. Aspiration or ether pneumonia.
- IV. Embolism.
- V. Mucus.
- VI. Ether eye.

At this juncture, permit me to remark that, while nervousness may be

the "sad prerogative of woman," the latter sex does not, as a rule, betray nearly as much fear as men do in the anæsthesia room. Whether it is because their natures are *per se* more placid and yielding than those of men, or whether it is because they are less addicted to a fluid which has for its chemical formula $C_4O_2H_6$, it is difficult to say, but certainly the gentler sex seem to pass into the narcotic state in a more matter of fact, has-to-be or this-way-please fashion.

Considered from a practical standpoint, however, and for the purposes of surgery, the unpleasantness of ether anæsthesia is responsible for a good deal of the dread entertained by the majority of intelligent individuals, and the knowledge of its disagreeableness is quite universal. I have seen ether administered in several cities of the world, and at times it has been quite impossible for one not to realize some of its loathsome properties, and, without desiring to enter into any controversy in regard to the relative merits or demerits of chloroform and ether, but considering them only from the standpoint of æstheticism, I, for one, believe that surgery would have been a far more æsthetic art if ether had never been discovered.

It may be said that the fear of any induced state soon vanishes if its approach is rendered pleasant. Nitrous oxide, for instance, is not feared as a rule, although the loss of consciousness may be fairly complete. The world has possibly indulged in alcohol, opium, cannabis indica, cocaine, and other drugs, because the semi-narcotic state thereby induced carries an element of pleasure or of exhilaration with it, and with its usual calmness it forgets all about the danger.

Possibly, if surgical anæsthesia could be made an absolutely pleasant process, one could look forward to it, if not with intense delight, at least not with that dread which every surgeon of to-day has to consider when he broaches the subject of operation to a patient. Some day, perhaps, the brilliant laboratory researches of a physiological chemist will evolve an anæsthetic which will combine pleasantness, utility and absolute safety, and preferably one that will not entail one's giving up one's consciousness. This anæsthetic will be prompt in its action, and its induction will be independent of any efforts on the part of the patient. If it be necessary for the patient to lose consciousness he will be anæsthetized amidst the comfort and privacy of his room, so that his feelings will be spared the journey from the ward to the operating room, which is apt to bring to a sensitive or imaginative mind the picture of the old French tumbril of revolutionary times.

As regards absolute safety in an anæsthetic, however, this is, to my mind, on the same par as absolute zero of temperature; that is, it is an

entity that exists only in thought, for in general anæsthesia, not only the relative toxicity of the anæsthetic in itself has to be considered, but the condition brought about by its action, and so long as the nervous system must be rendered inert and converted into a state that is a physiological deviation from the normal, then so long will there be danger.

But until the somewhat Utopian dream outlined above is realized, what can we do in the direction of æsthetic anæsthesia? and when I make use of the latter expression, I have in mind those cases which constitute the great part of that deliberate operating which is such a feature of our surgical amphitheatre to-day, many of which are elective, and perhaps mere essentials to comfort and only remotely questions of life and death. In these cases it is our duty to render the anæsthetic approach as pleasant as possible. In emergency cases, where every moment counts, and where the patient's consciousness is dulled to almost non-perception, the anæsthetic is either hailed with relief or absolute apathy, and here the only reasonable consideration should be in the direction of safe anæsthetization.

A great deal might be accomplished in the way of a more thorough and a more practical training in anæsthetics for our medical students, though we must recognize, as the *Lancet* has stated, "that anæsthetics have less allurements than let us say bacteriology, and examinations of the dark passages of the human frame offer more interest to the beginner than acquiring a perfunctory acquaintance with the processes of narcosis."

You or I, no doubt, preferred "carving destiny" in the dissecting room to observing the relative size of the pupil during the different stages of anæsthesia.

Anæsthesia has not kept pace with surgery during the past sixty years, and I imagine that phantom fame is responsible, to some extent at least, for this fact, for "while it is usual to hear of the wonders of modern surgery and the triumphs of the scapel, how often is it recognized that a skilled and experienced anæsthetist has fought for a patient's life through a weary hour or more, and has enabled his colleague, the eminent surgeon, to accomplish another victory?"

We hear a good deal from time to time respecting the necessity for the development of the expert in anæsthesia, but it should be remembered that the specialist can only be evolved from a large number of good anæsthetists, and in order that the latter may be produced we must train all our students in a consistent manner. In the hospitals of New York, a certain fixed period of the service of every house surgeon is devoted to the administration of anæsthetics, with the result that anæsthesia is put

on the same level as any other surgical work, and carries with it a considerable monetary value in the first few years of practice owing to the conditions which prevail in New York. Moreover, every hospital has its special anæsthetist, who is generally an outside man, and who, in addition to giving anæsthetics to private patients, trains the "green" men who come on service in July and January.

The use of nitrous oxide as a preliminary to ether is quite prevalent in America, just as it is in the Royal Victoria Hospital, and the result is, on the whole, satisfactory. One finds that in the majority of cases of nitrous oxide-ether anæsthesia—and certainly in all the successful cases—the loss of consciousness is quite immediate and not at all unpleasant, and the disagreeable taste of ether, to which most patients object, is not experienced; and it should be the ambition of the administrator to avoid this sensation. Then, again, the mere fact that patients are promised nitrous oxide as a preliminary to ether seems to alleviate their dread to some extent, for in all hospitals patients tell their experiences to one another. Finally, there is usually less struggling, and when a patient enters into the anæsthetic state peacefully and quietly, the awakening is apt to have the same characteristics.

In conclusion, the question of anæsthesia in general may be said to constitute one of the many problems of surgery, and our watchword should be the late Cecil Rhodes' famous slogan: "So little done, so much to do."

THE RECENT REACTIONARY TEACHING CONCERNING SUMMER DIARRHŒAS.

BY

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That there is nothing new under the sun is a truism that will be emphasized here. This sounds paradoxical to the title of the paper. Yet the recent discoveries in infantile diatetics, as brought out below, were not unknown a couple of generations back. They have only been ignored since then. Their recent revival will, however, stand "four-square to all the winds that blow," for they are amply substantiated by numerous careful clinical observations and experimentations, as well as by thorough researches in the laboratory. As one of the results of this work, the system of infantile diatetics generally preached has been revolutionized.

The authors of this revolution are Professor H. Finkelstein and his assistants, Doctors Ludwig F. Meyer and J. Rosenstern.

Their teaching has already gained ground in Berlin and many other parts of Germany. On this side of the Atlantic it is barely known, and still less acknowledged. Particularly in Canada, the few who are cognizant in only a general way, are diffident of it. This is, however, not the only instance of opposition to innovations in Medicine. As eminent a scientific man as Charles Creighton disputed the value of vaccination as late as fifteen years ago. There exist a sturdy few, even to-day, who disclaim the Theory of Evolution. What criticism did not Lister have to contend with before the tide began to turn in the direction he indicated. To-day the other extreme has been established. We live in a "Bacteriophilic" Age. Truly there is still marked evidence of the existence of Chauvinism in Medicine.

Yet to one who has seen the success in practice of this new teaching, such opposition serves only as a stimulant. Say what you will, infantile diatetics as taught and practised to-day in connection with the terrible summer diarrhœas is mainly empirical. And, although he is rowing against stream, yet Finkelstein moots this new dietetic therapy from a purely radical standpoint.

And, supposing this paper has not accomplished the conversion of those who would disclaim the pathogenesis of summer diarrhœas as set forth by Finkelstein, let us hope it will have succeeded in reducing the propensity to see all severe disturbances through "bacteriophilic" spectacles.

Just a preliminary word concerning the elaborator of this novelty. Finkelstein is a cautious *clinical observer* and a clear scientific thinker. He is, however, not unlike that genius of music, Beethoven—imperfectly capable of expressing his ideas in words. He is, in consequence, not a bright lecturer, and, at the same time, an infrequent one. Likewise, he is also tardy and non-prolific in his publications. These may explain to some extent the belatedness of the dispersion of his views.

Now, since the advent of the twentieth century, the medical profession is getting to recognize more and more the role played in diagnosis by the Laboratory. Not the bacteriological laboratory alone, but the chemical laboratory has rendered its service to medical science. It was the perception of this that actuated Finkelstein in the work which led to these disclosures. At the *Städtischen Kindersyl*, in Berlin, of which he is the chief, every modern laboratory convenience has been installed. The institution itself contains about 200 cots for infants under one year of age. Every child is also considered as legitimate material for experimental research work in the interests of

humanity (superfluous is it to mention that unnecessary or extreme risks are never permitted). In connection with every patient admitted, a certain systematic routine is carried out. Part of this routine consists in the thorough examination of the urine and the fæces. But, you ask, how is it possible to collect the urine or the fæces, separately, in an infant, only a week old for instance? The vessel is certainly not maintained *in situ* for a few hours by the patient hands of a nurse. They have a much simpler device.

In the male infant, the penis is inserted into a test-tube, then the diaper being applied in a particular manner, easily keeps it in place. An infant's size female glass urinal is employed in like manner in an infant of the opposite sex.

In order to collect the fæces, the following mechanism is employed. A sort of canvas hammock is suspended over the cot being tightly strung between the raised railings at the head and the foot. The half of the hammock next to the foot is longitudinally split up. The child is laid on the hammock, its lower limbs being secured to these two lateral flaps, respectively. The rest of the child's body is also secured accordingly. In this position the child remains, in a fairly comfortable state, for about 24 hours. The lower limbs being separated, the fæces drop to the cot where they are received in a basin. The urine is separately collected in a test-tube or in a glass urinal according to the method mentioned above.

I.

Acute Gastro-Enteric Intoxication is the generic term employed by Holt as the synonym for the disturbances known as summer diarrhœa, gastro-enteritis, cholera infantum, or mycotic diarrhœa. In defining the condition, Holt asserts that it is "due mainly to the absorption of toxic materials, the result of putrefactive changes in the intestine." In accord with most authorities, he calls it an infectious condition of the alimentary tract.

Intoxication, pure and simple, is the term preferred by Finkelstein for this same clinical condition. He selects this term because it is non-committal as to the etiological factor. Of others he would prefer that of *Alimentary Intoxication*. He specifies the alimentary tract as the haven of the offending agent. But, he denies that in the bacteria, and in the products of decomposition of the food within the alimentary tract, lies the pathogenesis. In the subject matter to follow, the term *Intoxication* will, therefore, be the one employed.

This paper does not pretend to be more than an epitome of the ways and means by which these conclusions were reached. The research

work carried out in the laboratory will be merely referred to. The experimental induction of this disorder will be described. We shall also point out how the conclusions resulting from this work materially influence the practice of dietetic therapy.

Let us see what, according to Finkelstein, constitute the symptom-complex of Intoxication:

- (a) Disturbance of consciousness.
- (b) Characteristic alteration in the breathing.
- (c) Alimentary Glycosuria.
- (d) Fever.
- (e) Collapse.
- (f) Diarrhœa.
- (g) Albuminuria and Casts.
- (h) (Sudden) Drop in Weight.
- (i) Leucocytosis.

At once one notes that two of the nine signs and symptoms have rarely been quoted in previous descriptions of this disorder. I refer to the characteristic alteration in the breathing and to the glycosuria.

The *breathing* of such children is pathognomonic. The child takes "heavy, deep breaths that are prolonged and somewhat rapid." In very grave cases they are "of a sighing and panting character."

The *glycosuria* is decidedly pathognomonic. Besides being symptomatic, it is nearly always premonitory. It foretells the coming of the storm.

That sugar is excreted in the urine of infants suffering from acute gastro-enteric disturbances is not entirely new. Lesage, von Hofstein, and Gross remarked this some years before. No particular interest was, however, entertained, until recently Langstein and Steinitz took up the thread. They examined the urine in fourteen cases of severe Gastro-enteric disorders, and found sugar and allied substances present. It is of interest to note that all of these cases, except one, were being fed on the breast.

Following upon this, Finkelstein and Meyer showed the same condition in over one hundred and fifty cases of Intoxication. Through the admirable and freehand system at the Kinderasyl, as above described, they were able to show that sugar appears in the urine even *before* the clinical symptoms have made their appearance. They remarked that most of these were breast-fed babies, the remaining ones being fed on cow's milk. They also observed that within five or six hours after all food had been withheld, the sugar disappeared from the urine. In light cases, on resuming small quantities of the same food—after starvation—the sugar remained absent from the urine. In severe cases it

reappeared. Thus, in the case of one child that was being fed—after a period of starvation—with only one and a half teaspoonfuls of breast-milk, five times in the twenty-four hours, the glycosuria returned.

This glycosuria is not a symptom of Diabetes. In the latter disorder the sugar is in the form of glucose; in Intoxication it is lactose and galactose, while glucose is extremely rare. Should the latter be found in the urine of "Intoxicated" children, then the case is a very grave one. As a rule, the metabolism of the average case of Intoxication can burn up a monosaccharide—especially glucose—fairly easily. It is the lactose and galactose that are so difficult of oxidation.

Now, if lactose alone be excreted, the prognosis is a happy one. It shows that the part at fault is only the intestinal epithelium, and not the general metabolism. It proves that the intestinal epithelium has failed to produce the invertin. The usual inversion of lactose into galactose and dextrose has, therefore, not taken place, and the lactose is allowed to enter the circulation unchanged. But the tissues are, as a rule, unable to oxidize the disaccharide, and it is, therefore, excreted in the urine. But, if one of the inverted products—galactose, for instance—is found in the urine, then it speaks gravely for the child. It shows that the whole metabolism is deranged. It shows that although with a healthy metabolism a monosaccharide is easily oxidised, in the present state of metabolism it is impossible.

Let us here interpolate that no glycosuria was found when farinaceous foods were administered to cases of Intoxication.

A series of researches were carried out to investigate the state of proteid metabolism in Intoxication. The following is only the gist.

A noteworthy case of *Decomposition** is recorded. It shows something of extreme interest. In spite of the constant decrease in body weight, *the nitrogenous constituent of the body tissues suffered comparatively little loss.*

In contradistinction to this, he quotes the following case out of a number. It is one of typical Intoxication. On August the 8th, 1905, a five-months-old infant in a rundown condition was admitted to the wards of the Kinderasyl. Weight, 3,750 gms. (cf. a normal of 5500 gms). It was then fed with $\frac{3}{4}$ (non-contaminated) milk plus 5% sugar. Eight days later it had acquired a severe Intoxication. The body-weight dropped to 3,280 gms. The child was starved for a day—only

* By *Decomposition*, Finkelstein signifies the disturbance which is usually known as dyspepsia, and which is due to the absorption of the products of decomposing food in the intestinal canal. This fits in with Holt's definition of Acute Gastro-Enteric Intoxication. But it differs from true *Intoxication* mainly by the absence of two cardinal signs—the glycosuria and the characteristic breathing.

weak tea, without any sugar, being allowed. The body-weight rose 20 gms. In the next twenty-four hours the patient received 100 to 140 gms. $\frac{1}{2}$ milk plus 5% sugar. Two days later the body-weight was diminished by 180 gms. and the following day the child died.

In the case of this child it was found that the amount of nitrogenous matter excreted in the urine was far greater than in the cases of some other children who had recovered after a two-days period of starvation. Hence, the deduction follows that intoxication favours an increased disintegrating process of the proteids of the body-cells—a very grave state certainly.

They also observed that the urea-synthesis in cases of Intoxication is grossly reduced and that the NH_3 -coefficient (i.e., the proportion of NH_3 compounds to the total nitrogenous substance of the body) is markedly increased, showing, therefore, that in Intoxication there is a grave disorder of metabolism present, that overshadows all other signs, even the gastro-intestinal.

Regarding the researches in the fat-metabolism, no definite statements have as yet been made.

II.

We shall now see what was revealed by accurate clinical observation on ordinary and on experimental cases of Intoxication in Finklestein's Institute. (Unless otherwise stated, it is to be understood that the milk employed in these experiments was as free from bacterial contamination as possible).

From the result of the researches in metabolism above mentioned, they were led to try the following series of experiments.

They took a number of infants that were in comparatively good health. These were fed with buttermilk containing 5% Liebig's sugar in solution. Daily, the quantity of food was increased fairly rapidly. After two weeks the symptom-complex of Intoxication became manifest. In a certain number of them, food was then withheld for from 12 to 24 hours; only weak tea, without any sugar, was allowed. After this, skimmed milk in small quantities, increased very gradually, was given. The de-Intoxication then took place rapidly. In some of the children, the de-Intoxication occurred after the starvation period alone; in others, not until after the skimmed milk had been given. In the remainder of these experimental cases, the children were not starved. The same food was continued, but the additional sugar was excluded. Yet de-Intoxication took place just the same.

In another series of experiments, a number of weakly infants were

fed with Keller's *Malzsuppe*. This is a preparation containing the following:

Wheaten Flour	50 gm.
Malt Extract	100 "
Milk	330 "
Water	660 "

The result of such feeding was soon manifested in a severe Intoxication with bloody and purulent discharges in the stools. A few of these cases ended fatally, in spite of subsequent treatment. In fact, of the total number of deaths from Intoxication experimentally induced by the various food-mixtures, those originating from the *Malzsuppe* constituted the greatest bulk.

Note the following apparently paradoxical record. Finkelstein relates cases of *Intoxication produced by overfeeding on the breasts of their own mothers*. He also points out that a number of cases of Intoxication recovered only very slowly on the breast. Others he has also noted, who had progressed favourably under starvation, yet suffered a relapse when returned to the breast. Indeed, one or two of these cases terminated very quickly in death. There were also cases in which recovery after starvation was succeeded by severe relapse—in one case ending fatally—through the too hasty addition of fat to the food.

I transcribe the following two cases on account of their emphatic contrasts:

"Julius B. Four weeks old. Experimental Intoxication induced through $\frac{1}{3}$ milk plus 5% Liebig's sugar. Further aggravation when a 5% solution of sugar alone was administered. Then small quantities of breast-milk alone, and weight stopped falling. Death following upon collapse. No complications."

"Otto F. Two months old. Intoxication through (daily) 500 gms. buttermilk with full milk. Critical (rapid) recovery on tea and the casein out of 500 gms. skimmed milk."

These and other experiments and investigations, therefore, conducted to a new conception with regard to the pathogenesis of cholera infantum. It is a conception that is revolutionary to the one generally upheld at the present time. Briefly, this conception is as in the following *resumé*.

III.

The symptom-complex that is known by the names of Acute Gastro-Enteric Intoxication or Summer Diarrhœa or Cholera Infantum is, in the main, not an infectious or contagious disease. It is, in the large majority of cases, not due to the absorption of the very toxins of the

bacteria, nor of the toxic decomposition products of bacterial decomposition, within the alimentary canal. The above-mentioned carefully-worked-out facts sustain this.

It is remarked, for instance, that within twenty-four hours after starvation has been instituted, the temperature usually recedes to about the normal. Were the condition infectious, such would not be the case. In some few cases, the temperature does not fall to the red line. In these, one therefore concludes that a co-existing infectious condition—whether of the alimentary tract or elsewhere—is present.

Why is it that the majority of cases of intoxication show none—or almost that—of any pathological lesion of the intestinal mucosa, beyond some hyperæmia? (cf. Holt). Should there not be a definite localized lesion, if this were essentially a mycotic disorder? Thus, we can easily understand in diphtheria how there is a general intoxication of the circulation, which is due to a manifest localised lesion—the bacilli inhabiting the leathery-gray membrane only. Similarly, in typhoid fever, the bacilli are centered chiefly in the Peyer's patches and solitary follicles of the intestine, whereas the symptoms and disturbances are generalised. They are toxic. But, in the summer diarrhœas—excepting the rarer iliocolitic forms—can one indicate any particular gastric or intestinal lesion in which the bacteria have made their stronghold? Is it not true that no such lesions have been found even in some of the gravest cases? Has not one remarked, time and again, how the acute general disturbance is by far out of proportion to the alimentary or gastro-enteric symptoms?

Has a single bacterium been unearthed that was definitely concurred in by most authorities as the cause of this condition? No! Now and again, some worker discovers a bacillus only to find that another investigator honours a totally different one.

How, then, is one to account for the *Leucocytosis* that is present? For, apart from the outcome of the concentration of the blood through the rapid loss of the body-fluids, there can, no doubt, be proven an absolute leucocytosis. Let us, however, pause for a moment. A leucocytosis does not necessarily signify an infection. It is well known, for instance, that certain drugs—pilocarpine, antipyrine, salicylates, and ergotin—will produce it. Likewise, certain auto-intoxications—of which gout and uræmia are examples—will evidence it. In infants, Japha and Schlesinger have shown that it may occur in conditions other than infectious inflammation of the gut-wall; it occurs in cases of alimentary disturbance that is accompanied by general poisoning-symptoms. Surely, therefore, the hypothesis of the generation in the intestine of bacterial toxins and their absorption into the blood-stream cannot hold!

What about the hypothesis concerning the absorption of putrefactive products? This, too, cannot hold. It is true that when the bowel is cleared of all its contents, those grave general symptoms abate. But supposing the same quality or quantity of food be reverted to, and supposing all aseptic precautions regarding the food have been employed: will the severe symptoms remain in abeyance? Finkelstein has replied to this through various experimentations and observations, in the negative.

Besides, it has been observed that Intoxication will complicate infections that have their mycotic seat outside of the gastro-intestinal canal. Thus in pneumonia, measles, scarlatina, whooping-cough, etc., or any septic condition, a concurrent alimentary disturbance—often a true *Intoxication* has been recognized.

Where, then, is one to look for the origin of this disturbance?

The immediate incitative is a factor that has been heretofore overlooked. The presence of glycosuria opens one's eyes to a new view. The defective urea-synthesis, the excessive NH_3 coefficient, the excretion by the kidneys of the self same nitrogenous compounds ingested with the food (as proven experimentally)—all point distinctly to a grave disturbance of metabolism with deficient oxidation. Proteid, as well as fat, metabolism is deranged.

As has been demonstrated above, the mischief-maker is the sugar. It is reviving the now ancient teaching of the older physicians—that this is a "Sugar Fever." The experimentations above alluded to have conclusively proven that signs and symptoms identical with those of Cholera Infantum and its allies can be produced by the ingestion of excessive sugar. Predisposing and "preparing the soil for the seed" are, of course, those well-known factors—bad hygienic surroundings, excessive or indigestible diet or both, premature birth and debility, debilitating infectious diseases within or without the alimentary tract. The so-called "Buttermilk Fever" is nothing more nor less than Sugar Fever, produced by the superadded sugar, as exposed in the second section of this paper. Indeed, far from being injurious, buttermilk has been proven the safer food.

Sugar may be one of the richest of infants' foods, yet it is possible for the infant to be getting too much of a good thing. According to the elaborations of Finkelstein and his co-workers, no hard and fast rule exists concerning the tolerating quantity. Each child is individual in its tolerance. This individual tolerance is, however, often reduced by extenuating conditions—the so-called predisposing factors. Be it, however, remarked that breast-fed children come under the same category as those fed with cow's milk. But those children fed with sterilized and

proprietary infant-foods during the summer months, are much more on the brink of the volcano. That there is actually "poison in the pot" for these children is a well-known fact. Here, in fact, lies the explanation why the babies of the wealthy classes enjoy no distinctive immunity from those of the poor—despite the religious asepsis. That the proprietary infant-foods are extremely rich in sugar is well known to the reader.

What harm—if any—is there from the fat in the food? The predisposing factors aiding and abetting the intoxicating power of the sugar, serve also for the fat—but to a much smaller degree. This is Finkelstein's teaching. Very often excessive sugar will induce even the prodromal dyspepsia that usually proceeds Intoxication. The fat, however, is rather like the last straw that broke the camel's back. It never produces the prodromes themselves, but it often precipitates the latter into the intoxication. The fat in the food also seems to add fuel to the fire.

And now we can see why breast-milk is often the wrong food to employ immediately after the starvation period. Thus, also, Salge has shown that Intoxicated infants when fed on centrifugalized (fat-free) breast-milk did well. Hence, it is erroneous to believe that cases of summer diarrhoea that do not improve on the breast are doomed.

What harm—if any—is there in the casein? Finkelstein and his staff in all their researches on this subject have been unable to demonstrate anything but benefit from feeding albumin or casein (without the whey). None of the so-called toxic decomposition products could be proven.

IV.

Lastly, what can we do for such children?

1. As is generally taught, so also here—withhold all food for 24 hours or more. Give boiled water or weak tea *ad lib*. If it is necessary to sweeten, do not add sugar but use saccharine instead.

2. Stimulants p.r.n.

3. Feeding should be resumed with extreme caution. Especially, do not at once put the child to breast. Give very small quantities of food to start with. Make up the difference in the small quantity of fluids given, by abundance of water or weak tea, as above; this is very important. As regards the kind of food: begin with one that has very little or none of sugar and fat. Begin to add sugar and fat very gradually, and while doing so be on the watch against the return of symptoms. Each case will have to be judged on its individual merits as to how soon these two constituents may be added, and how quickly increased to the usual quantity.

An ideal plan is as follows:—

Starve the child. In extreme urgencies, however, starvation will have to be dispensed with. Water or tea, *ad lib.*, as above. Then, give buttermilk (without any additional sugar), one drachm and a half, five times during the first twenty-four hours. Water or weak tea *ad libitum*.

The second day, double the quantity of food. The third day, often not till the fourth day, give an ounce (or as much as you may consider safe) of the following preparation:—

Water	1 pint.
Buttermilk	1 pint.
Casein (from 2 pints of milk).	

The casein employed in this mixture is derived from the best milk by the addition of rennet. The whey is, of course, discarded. The curd is dropped into a fine hair sieve. The water having been previously boiled and then cooled, is slowly poured over this: meanwhile the curd is being continuously chopped up and rubbed through sieve. The resultant filtrate is returned to the sieve, and the process repeated. This is done a few times until the casein particles are so finely divided as to easily pass through the meshes of the sieve. The buttermilk is then added. The mixture must be kept in a cool place, and it must be made fresh every day. The container must be shaken well before doling out a part of its contents, for the casein particles tend to gravitate.

After three days, or even longer, of this feeding, add 1% of sugar. Then raise this quantity quite gradually to 5%—being ever on the look-out for a recurrence of the toxic symptoms (rise of temperature, green, mucinous, non-homogeneous stools, characteristic breathing, alimentary glycosuria, etc.). When the child is well past the danger of relapse, one may once more resume its usual feeding. It is important to note that the disappearance of sugar from the urine takes place concurrently with that of the disturbance of consciousness.

Prophylactic Measures.

In addition to the general hygienic measures, the following merit special mention:

In breast-fed infants: Beware of too frequent feeding and of over-feeding. It is much safer—and often soothing enough—to give an extra feeding of unsugared water or weak tea than of the breast. When you notice the least sign of dyspepsia, reduce the number of feedings *per diem*. Sometimes it is even advisable to stop the breast for 12 hours or more.

In artificially-fed children: The same applies. In addition, the following are of extreme importance. Employ the proprietary foods

with extreme precaution. Cow's milk, diluted, is much preferable in the summer months. When the fore-runners of the squall—in the shape of dyspeptic symptoms—make themselves manifest, either the superadded sugar must be eliminated entirely, or its quantity materially reduced. Likewise, it is often advisable to reduce the quantity of fat. In this connection it will be seen why the following sentence deserves to stand by itself in italics.

One can never be too much impressed with the fact that in the summer months an ordinary innocent dyspepsia—green, non-homogeneous, mucinous stools, etc.—can be easily launched into a severe Intoxication, through indiscretions in the quality as well as in the quantity of the food.

In dubious cases of dyspepsia in infants, especially in weaklings and those of premature birth, examine a specimen of the urine. Lactosuria and galactosuria is present in the urine previous to the transition of a simple indigestion into Intoxication.

This alimentary glycosuria is, therefore, the most reliable danger-signal and should guide the physician in the necessary course he is to take.

THE

Montreal Medical Journal.

A Monthly Record of the Progress of Medical and Surgical Science.

EDITED BY

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No. 10

THE NEW CURE FOR SYPHILIS.

It will be easy enough five or ten years hence to say whether or not the so-called "606" is a cure for syphilis, but it is by no means so easy to-day. The drug that has been applied to the cure of syphilis by Ehrlich has already produced results so striking as to forbid us to take too sceptical a view of its possibilities. It must be admitted that there are from the outset things to regret; if it should prove a cure for syphilis it is a pity that it should be known by a number, and it is also a pity that one firm seems to have been allowed to patent it. Drug-manufacturers have made stupendous amounts of money out of suffering humanity in the sale of a preparation like diphtheria antitoxin, and science has gone bare; is this to be another case of the same?

The main fact of interest, however, is that this drug—an organic compound of arsenic—may actually be a cure for syphilis. Those who have thought of the cure of syphilis in terms of years, and of endless trouble, and of disheartening obstacles and relapses, will find it hard to believe that a single dose can supply the place of it all; but this is an essential part of the process; the preparation of arsenic is injected in one large dose to overwhelm the spirochæte or treponema; lesser doses, not fatal to the organism, serve only to allow it to develop an immunity to the drug. The danger exists that in killing the organism one may kill the patient, or at least that in destroying the intruder one may damage the tissues of the host, and, as a matter of fact, some deaths have already occurred by its use. This may be the price that humanity has to pay for this par-

ticular blessing. We can safely predict that this danger will not prevent its having a full trial, for there are syphilitics who would readily die for a chance of cure; its value must be determined by experiment, and the case must be straightly put to the patient concerned; time alone can tell the truth about the completeness of the cure. In the meantime, we can wait in good hope that the new preparation—arsen-phenol-amin—is an advance upon our previous methods.

DEATH OF DR. ROTTOT.

It is with much regret we record the death of Jean Philippe Rottot, formerly dean of Laval University, who died 28th September, after a long illness, at the advanced age of 85 years. Dr. Rottot was probably the oldest physician in the province, and had been in active practice for over sixty years.

Jean Philippe Rottot was born at L'Assomption in 1827, and after his admission to the practice of medicine in 1849 established himself in Montreal. He soon secured an extensive practice, and the confidence of his fellow-citizens brought him in 1856 to the City Council, where he represented St. Mary's ward until 1859.

Dr. Rottot was a member of the Montreal School of Medicine and Surgery until the establishment of the Montreal branch of Laval University, of which he was one of the founders. He was dean of Laval for many years, having resigned in 1907. His confreres tendered him a complimentary banquet, and he was entertained by the medical faculty in 1897, on the occasion of his professional jubilee.

In 1849 Dr. Rottot was appointed a captain in the 10th Battalion of the Canadian militia, under Lord Elgin. He was married twice. His first wife was Sarah O'Leary, and the second Dame Aglae Benoit, who survives him. He leaves two sons, of whom the Rev. Father E. Rottot, S.J., is one.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

The first regular meeting for session 1910-11 was held in the Society's rooms on Friday evening, October 7th, at 8.30 sharp. The Society was addressed by Dr. Thomas McCrae, of Baltimore, who took as his subject "Chronic Rheumatism." After the address there was an informal "Smoker."

The following Papers have been arranged for the dates mentioned:

October 7.—An address by Dr. Thomas McCrae, of Baltimore, on "So-called Chronic Rheumatism."

October 21.—The President's Annual Report, W. Grant Stewart.

November 4.—Symposium on Röntgen Rays.

November 18.—Acute Epidemic Poliomyelitis, D. A. Shirres.

December 2.—The Treatment of Pelvic Contraction by the General Practitioner, D. J. Evans.

December 16.—The Open Treatment of Fractures, with a Lantern Demonstration. J. M. Elder.

Officers: President, Dr. C. F. Martin; Vice-President, Dr. J. M. Elder; Treasurer, Dr. R. P. Campbell; Trustees, Dr. A. T. Bazin, Dr. W. F. Hamilton, Dr. J. Alex. Hutchison; Secretary, Dr. Hanford McKee, 249 Mountain St., Tel. Up. 4035; Meetings: 8.30 p.m. First and Third Fridays of each month from October to June. Telephone in Rooms Up. 2646.

Reviews and Notices of Books.

DISEASES OF THE COLON AND THEIR SURGICAL TREATMENT. By P. LOCKHART MUMMERY, F.R.C.S., Eng. Bristol. John Wright and Sons, Ltd., 1910.

In these days of much writing and publishing, there has arisen a class of medical book whose position in the book-world lies somewhere between the large students' textbook and the monograph. The books to which we refer lack alike the conciseness of the one and the detailed knowledge of the other. They treat usually of the diseases of some particular organ or system, not of some particular disease or aspect of disease. Their field is too broad for the monograph and not broad enough for the textbook. The student, or practitioner, finds them too long, and the specialist finds them too short. They fall between two stools. They lack a justifiable *raison d'être*.

In the reviewer's mind the foregoing book belongs essentially to this class. Yet, in saying this, one does not mean that such books do not represent much labour and much sound, even valuable, work. They often do, as does in fact the present volume. No; but the labour is misdirected. On the one hand, the work of covering the field properly involves the repetition of much that the textbook gives; and on the other hand, the limitations set by the publisher and by the author's own time, forbid that full and deep treatment of the subject for which the more experienced man is looking.

In this book, of 317 pages, Mr. Mummery devotes 41 to a brief consideration of the anatomy, development, physiology, both normal and pathological, and the bacteriology of the colon. The value of these

chapters is somewhat lessened by their brevity, and by the lack of all but the scantiest bibliography. Indeed, this lack of consideration of other work in this same department is sadly evident throughout the book. What few references are given are almost entirely to British literature. For instance, in discussing the blood supply of the pelvic colon, the work of Jamieson and Dobson is the only one mentioned, although a great deal of it had been anticipated by American and Continental workers. In the chapter on occlusion of the colon, Mr. Mummery relates, briefly, the results of certain experiments of his own on cats, which proved that the meteorism of occlusion is the result of bacterial action, that the gas formed consisted chiefly of CO_2 , and that this gas was normally reabsorbed by the venous blood. Thus, when the venous circulation is blocked meteorism may develop, with or without occlusion.

The succeeding chapter upon methods of diagnosis is one of the best. It is practical and fully up-to-date, and is clearly written out of the fulness of experience.

In chapter VI are considered the congenital abnormalities of the colon. The bulk of it concerns that obscure condition known as congenital dilatation and hypertrophy of the colon. This is treated with some fulness of detail, and the author reports briefly a favourable result in one of his own cases from the operation of appendicostomy with daily irrigation of the dilated colon. This is, so far as we know, a new procedure in the treatment of this rather desperate disease, and deserves consideration as well for its harmlessness as for the good result obtained.

The chapter on volvulus of the colon is a brief but good presentation of the subject. The following one, on adhesions and kinking of the colon, must be considered as somewhat inadequate, particularly that part of it which concerns treatment. The pages devoted to "enteroptosis of the transverse colon" are valuable. Diagnosis by the X-Ray picture, following a bismuth injection, as in Hertz's method, is commended; as to treatment, the writer discourages operation, and is markedly conservative.

The chapter on "chronic mucous or membranous colitis" is, perhaps, the best in the book. Mr. Mummery is strongly in favour of an appendicostomy when medical measures fail; and he is able to report a considerable number of excellent results. The same is to be said on the chapter on ulcerative colitis, the acute cases of which are so fatal. Here, again, an appendicostomy in his experience does much good, and is, indeed the only satisfactory treatment. He prefers it decidedly to a colostomy.

Then follow sections on simple perforating ulcer of the colon; on pericolicitis, including "diverticulitis" (no reference to the considerable

amount of American and German work in this new field), on hyperplastic tuberculosis of the colon, on constipation, on simple stricture, on thrombosis or embolism of colic vessels; and finally, on operations upon the colon. All these, while good, and in one sense sufficient, disappoint the reviewer by their lack of a discussion of details. As against this, one welcomes the more or less frequent recital of personal opinion and experience. The two or three pages given to what Mr. Mummery calls "gaspipé colon," a form of hyperplastic tuberculosis in which the whole colon, or a considerable portion of it, is converted by inflammatory infiltration into a rigid tube, are very interesting and rather new. In the question of constipation, it is pleasant to find him exercising a welcome conservatism with regard to Mr. Lane's operation of resection of the whole colon; and to find him advising copious doses of fats, especially petroleum. Where operation seems indicated, he is for the harmless appendicectomy, at first, anyway. This has given him encouraging results.

These particulars of a wide experience, scattered through the book, make its reading both pleasant and profitable, to a certain extent. In this sense, it is to be recommended to student, practitioner, and surgeon alike. But if the surgeon desires a résumé of the present-day knowledge or any particular part of the subject, he must go further.

E. A.

THE ELEMENTS OF THE SCIENCE OF NUTRITION. By GRAHAM LUSK, Ph.D., M.A., F.R.S. (Edin.) Second Edition, revised, 402 pages, illustrated. W. B. Saunders Co., Philadelphia and London, 1910.

All are familiar with the work of Graham Lusk's Science of Nutrition. In the second edition he has endeavoured to bring the work as near up-to-date as is possible with a science that is making such rapid strides. The chapter on regulation of temperature should be carefully studied by every practitioner of medicine as it deals with the action of cold upon the body, the effect of the ingestion of food, the influence of climate, etc. The metabolism of protein fat and carbohydrate is covered in four chapters. One chapter is devoted to the consideration of the influence of mechanical work on metabolism, and two chapters to normal diet and food requirements during growth.

Six chapters are devoted to metabolism in anæmia, at high altitudes, in myxœdema, exophthalmic goitre, diabetes, phosphorus poisoning, metabolism in fever, and purin metabolism. In the last chapter, the recent theories of metabolism are briefly discussed.

The appendix includes several valuable tables published by the United States Department of Agriculture, Washington.

The aim of the book is to review the scientific substratum upon which rests the knowledge of nutrition, both in health and disease. Throughout, no statement has been made without endeavouring to give proof that it is true. The book should be of much value to the student of dietetics and to the clinical physician.

CLINICAL OBSTETRICS. By ROBERT JARDINE, M.D. Edin., M.R.C.S. Eng., F.R.S. Edin., Etc., Etc. Third revised edition, 717 pp., 108 illustrations, and 4 coloured plates. Toronto: J. F. Hartz, Ltd., 1910.

This is an excellent book for practitioners, though better supplemented with a more extensive treatise on the operative side of the subject.

The interesting introduction is followed by a series of chapters on the complications of pregnancy, with illustrative cases evidently the experience of a man with extensive practice and keen observation. In this section the only flaw is the rather scanty treatment of syphilis and the characteristic differences between the normal and syphilitic placenta.

Chapters on labour, its mechanism, management, and the normal puerperium, contain many useful hints, notably these.—“The third stage is usually over in about fifteen to twenty minutes. If it is prolonged much beyond that, the placenta is, in all probability, adherent.” The use of rubber gloves is considered unnecessary, deep cervical tears should be repaired, missing fragments of placenta or membranes should be immediately sought for and removed. In the estimation of the character of the puerperium “the pulse rate is a much safer guide than the temperature.”

Five chapters on hæmorrhages are full and fairly complete. It is doubtful whether an absolutely satisfactory treatise could be written on placenta prævia. Jardine is conservative, advocates Braxton Hicks' method, but also reports a case of Cæsarean section when there was pelvic contraction as additional indication.

Six chapters on delayed labour include two dealing with contracted pelves. In Glasgow 10 per cent. of the patients have evidence of rickets. “Each case must be judged on its own merits.”

“Reactive natural labors” and “complex or complicated labours” occupy seven chapters. Many interesting illustrative cases are given. The subject of eclampsia is treated in this section. The author believes in the necessity of sweating and purging and the encouragement of diuresis by infusions of salt solution. If labour has set in the patient should be delivered at once, but where the os is rigid interference is not advised. Bleeding does good.

After a chapter on “missed labour,” some eighty-four pages—five chapters—are devoted to “complications of the puerperium.” Some

thirty pages are given to puerperal infection. This is the most unsatisfactory portion of the book. Few obstetricians will concur in the advice to use 1 in 2,000 solution of bichloride of mercury as an intra-uterine douche.

The "obstetric operations" are well described. There is a section on pubectomy, but vaginal section is dismissed with a few words, the author has had no experience with it, and believes it will be seldom required.

Chapters on "accidents to the child during delivery," "diseases of the new born child," and "infant feeding," complete the main work, but an appendix is added containing many interesting and valuable tables of statistics from the Glasgow Maternity Hospital.

The book can be recommended as well written, well printed, and as containing much unusual information of value to the obstetrician.

H. M. L.

PROGRESSIVE MEDICINE. September, 1910. Lea & Febiger, Philadelphia. \$6.00 per annum.

The contents of Volume III are: Diseases of the Throat, by Dr. William Ewart; Dermatology and Syphilis, by Dr. W. S. Gottheil; Obstetrics, by Dr. E. P. Davis; Diseases of the Nervous System, by Dr. W. G. Spiller.

HISTORY OF MEDICINE. By DR. MAX NEUBERGER. Translated by ERNEST PLAYFAIR, M.B., M.R.C.P. To be completed in 2 Vols. Volume I, 403 pages (1910) \$6.50. London: Oxford Medical Publications. Toronto: D. T. McAinsh & Co.

This book comes to the reader with an introduction by Dr. Osler, done in his own unmistakable style. "Within the past twenty years," he begins, "there has been a remarkable revival of interest in the history of medicine. Chairs have been established . . . Societies and clubs devoted to the subject have been started; instead of one there are now three or four Journals, and the literature has been enriched with innumerable monographs and articles.

"A comparison of a volume of the *Index Medicus* for ten or twelve years ago with a recent one, shows how actively medicine is participating in the study of origins, and how much as a profession we are being influenced by modern historical methods." Dr. Osler then explains that the subject has several relations. For the student, the educational aspect is of incalculable value, "since medicine is best taught from the evolutionary standpoint;" as a study the history has peculiar attractions as a useful pastime for the leisure moments of busy men. He does not recommend, in view of the crowded state of the curriculum,

that the course should be made compulsory, since, as he remarked some years ago, an attractive course will catch the good man. The work which is being done upon the subject is enormous, after the example of Friend, Sprengel, Littré, Haesser, Daremberg, Adams, and Greenhill, —and, one may add, of Dr. Osler himself. Yet, in England, there is not a single chair of the history of medicine, although the Fitzpatrick Foundation, at the Royal College of Physicians, has yielded several important courses, and has brought out the studies of Dr. Paype in the medicine of the Anglo-Saxon period. Dr. Osler then summarises the work which is being done in Germany:—The collation under the direction of Professor Diehl of all the important MSS. in the libraries of Europe; the publication of a new text, under the auspices of the Imperial Academy of Berlin, of the Greek writers in medicine; the founding of an Institute at Leipzig as a memorial to the late Professor Puschmann, in which an entirely new edition of the Latin authors will be made.

The *Handbuch der Geschichte der Medizin* is the standard work of reference. It was designed by Puschmann himself, and edited by Neuburger and Pagel. Dr. Neuburger, the author of the book under review, is Professor of Medical History in the Imperial University of Vienna, where he was born and educated. The translation is done by Dr. Ernest Playfair. The present volume brings the history down to the Renaissance; it will be completed in another volume, which we are promised will be issued within the year. The scholarship displayed in the book may be taken for granted. What is more to the present point is that the book is extremely interesting; and those will be entertained by it who have no desire to be improved.

Retrospect of Current Literature.

MEDICINE.

UNDER THE CHARGE OF DRs. FINLEY, LAFLEUR, HAMILTON, AND HOWARD.

“Arsenobenzol und Syphilis”: Neisser, *Deut. Med. Woch.*, June 30, 1910; Fischer & Hoppe, *Münch. Med. Woch.* 29, 1910; Treupel, *Deut. Med. Woch.* 30, 1910; Wechselmann u. Lange, *Ibid*; Loeb, *Münch. Med. Woch.* 30, 1910; Glück, *Ibid* 31, 1910; v Zeissl, *Wiener Kl. Woch.* 32, 1910; Neisser u. Kuzalsky, *Berl. Kl. Woch.* 32, 1910; Heerheimer, *Deut. Med. Woch.* 33, 1910; Wechselmann, *Deut. Med. Woch.*, Sept. 15, 1910; Schwäbe, *Münch. Med. Woch.* 36, 1910; Wechselmann, *N. Y. Med. J.*, Sept. 3, 1910.

Nothing in the medical world of to-day attracts more wide-spread

interest from physician and patient than Ehrlich's new drug, variously known as Di-oxy-amido-arseno-benzol, "Hatol" and "606." For months the German weeklies have contained references to its developing virtues, and even the lay press has not hesitated to bring them before the general public.

The production of "606" is a striking example of patient investigation and progress with a definite end in view. For years Ehrlich has spoken of the possibility of "aiming chemically" to effect a definite therapeutic result. Ever since atoxyl was first found useful in sleeping sickness by Thomas, and of a certain usefulness in syphilis by others, Ehrlich has aimed at producing a preparation of increased efficiency to destroy the spirochæta or trypanosome, and of lessened danger to the individual.

Arsacetin and arsenophenylglycin are both products of this attempt. Eighteen months ago Prof. Ehrlich was good enough to send samples of the latter drug to Montreal for investigation. The results were published in this JOURNAL, and foreshadowed very closely "606," and illustrated certain important features in the treatment of protozoan diseases by this group of arsenical preparations. One of the most important of these points is the desirability of giving the drug in large sub-toxic doses—doses large enough to destroy or seriously injure all the micro-organisms at a blow, yet not so large as to endanger the patient's life, nor any of his organs, more especially the optic nerve which proved so susceptible to arsenical poisoning in atoxyl administration. These large doses are necessary, inasmuch as small repeated doses seems to injure but a proportion of the protozoa and impart a kind of immunity to arsenic to the remainder (arsenic-fast) so that subsequent doses have no effect.

The necessity of giving large doses, yet of avoiding symptoms of poisoning, and the danger of placing a little-tried drug of unstable composition, with a complicated method of administration, in the hands of those who may be lacking in the necessary training to use it properly, are doubtless among Ehrlich's reasons for confining the present trial to a few acknowledged authorities in close touch with himself, a decision with which we must agree, even if it prove to our immediate inconvenience. The drug is to be marketed in November, so we hear, and that members among physicians and laity look anxiously forward to next month can be taken for granted.

"606" is a yellow powder, which must be kept sealed in glass capsules as it decomposes rapidly. Its composition is $C_2H_2O_2U_2As_2$, grouped as its name indicates. It is only manufactured as yet in the Royal Institute for Theurapeutics, in Frankfort, and its method of preparation is a

secret, kept so, no doubt, to prevent possible dangerous imitations and too promiscuous use.

Prof. Ehrlich has records of some 7,000 cases treated, with 6 deaths, only one of which is likely attributable to the drug. Those who have worked clinically with it include Alt, of Acitssprung; Schreiber, of Magdeburg; Ionsen, of Russia, as well as the names appearing at the head of this review. The longest elapsed period since treatment was instituted, is said to be 11 months. Most writers began their work in April or March last. It is administered intravenously or intramuscularly or subcutaneously, and in the latter instances causes considerable pain, and in all cases some general reaction such as vomiting and temperature, shortly followed by a sensation of well-being. Nevertheless, it is well that the patient remain in bed a day or two at the time of administration.

It appears to act primarily by killing the spirochæta. Inside of 24 or 48 hours no further spirochætae can be found in a primary sore, and the sore, erosial or sclerotic in type, has assumed a healing aspect. It is equally prompt in condylomata and mucous patches, and only less so in the roseola and secondary syphilides, the papular type lasting the longest. Tertiary ulcers and gummata heal with surprising rapidity, though, of course, where loss of substance has occurred, no *restitutio ad integrum* is to be looked for. The painful lesions, bone pains and headache, of whatever stage, disappear almost like magic, while even early tabes and paresis are sensibly improved, though more advanced cases show less benefit. In malignant syphilis its powers are most evident. Cases which have resisted mercury and iodide in all their forms (mercury-fast) have yielded readily to "606."

The method of treatment adopted has been a single initial dose, and in many cases nothing more. Some cases have required a second or third dose after the lapse of a few weeks, as recurrences and cases of incomplete cure have occurred. These have generally been after a small initial dose and all have yielded to the additional injection.

The dose has steadily risen. Beginning with .1 to .3 g., as much as .7 g. or more has been given (usually .4 g.). As yet cases of heart or kidney disease have been excluded, as well as those showing changes in the eye grounds.

Not only has it proved so fatal to the spirochæta pallida, but recurrent fever and chicken spirillosis have yielded quite readily, and an occasional case of psoriasis and Lichen planus has benefited. Indeed, Hata's earliest work was confined to animal spirillosis.

As to the Wassermann reaction nothing definite can be said. A few

weeks after injection it usually becomes negative, but it may show extraordinary alteration within the first few months..

On the whole, it tends to pass from positive to negative.

Those who have worked most with "606" are, perhaps, most cautious. Neisser states, in an open letter to Ehrlich, that it is yet too early to say that "606" cures syphilis better than mercury, but that one can say that, with astonishing rapidity and power, it causes the signs and symptoms of syphilis to disappear, and that it is intensely inimical to the spirochæta pallida. "Most would do well," he concludes, to "await further experimental work as to the dose and necessity for re-injection."

"606" has not yet been tried outside Germany, though one has reason to believe that there are now small quantities in America.

Few diseases in recent years have demanded the attention of the profession of medicine to the same extent as syphilis. Metchnikoff and animal inoculation, the discovery of the spirochæta pallida by Schaudinn, the controversy and usefulness of the Wassermann reaction, and now a new therapeutic wonder have all come before us within the last 8 years. Should this last discovery make its position as firm as have even the least of the preceding, we shall indeed have cause for gratitude, not only for its manifest benefits, but for the fact that the chemistry of therapeutics could foresee and attain a definite objective.

R. P. C.

OBSTETRICS.

UNDER THE CHARGE OF DRs. CAMERON, EVANS AND LITTLE.

FRANKL, O. "Experiments with Momberg's tube." *Gyn. Rundschau*, 1910, IV. 2: p. 61; also *Cent. für Gyn.*, 1910, 23, p. 789.

The difference in the anatomical relations of the aorta in man and the lower animals makes it difficult to draw definite conclusions from many experiments, particularly those on rabbits. Frankl used large dogs. Application of the tube ligatures sufficiently tightly to occlude the femoral arteries was followed by incision of veins and arteries. There was no arterial bleeding, but invariably a certain amount of venous bleeding depending on the size and extent of the vessels below the constriction, their tone, the size of the openings made in their wall (the smaller the opening the quicker the thrombosis), and finally, the coagulability of the blood.

If the tube was sufficiently tightly drawn there was never any continuous bleeding. Reported failures in obstetric practice must be ascribed to insufficient tension of the ligature, and the guide must be not disappear-

ance of the pulse, but cessation of bleeding. Incomplete occlusion will increase the bleeding. Too rapid tightening will occlude veins before arteries, and the hæmorrhage will be more extensive.

The suggested dangerous results from the procedure were never noted during the experiments, except in one instance, when there was thrombosing of the vena cava. In all cases the vessels were examined macro- and microscopically and no evidence of injury was detected. Superficial rapid respiration, with marked heightening of the diaphragm, was more notable in the animal than in the parturient with very lax abdominal walls.

Records were made of the blood pressure during the experiments. There was a slight temporary rise in pressure after application of the tube, accompanied by a smaller pulse wave, persisting so long as the tube remains in place till the tube was loosened, when the pressure fell slightly and the pulse regained its fuller character. Under ordinary circumstances, the heart being sound, there is practically no danger in compressing the aorta. It is different when there has been serious hæmorrhage, or when the heart is weak. In such cases the application of an Esmarch to each thigh enables one to open the larger vascular field gradually and not throw an overload on the heart suddenly.

Where there has been severe hæmorrhage the sudden occlusion of the vessels may cut off the blood going to the heart to such an extent that syncope may result. This may be prevented by bandaging the lower limbs before applying compression; simple elevation of the pelvis is not sufficient.

Conclusions:

1. Momberg's method (aortic compression by means of a finger-thick rubber tube) is a practical method of controlling hæmorrhage in the lower half of the body, and is especially indicated for hæmorrhage in the third stage of labour.

2. Injury to skin, nervous system, bladder, intestines, or disturbances in respiration are not to be feared. The danger of thrombosis and embolism must be considered where there is sclerosis of vessels. When the heart is affected sudden loosening of the tube is dangerous.

3. Its application causes no dangerous alterations in blood pressure to a patient who has lost but little blood and whose heart is normal.

4. Used alone, it is extremely dangerous when there is anæmia of high grade. This danger can be removed by such measures as will produce a better "blood-filling" of the upper portion of the body before the tube is applied.

BURKARD (Graz) *Gynæcologische Rundschau*, 1910, IV, XVI, p. 648, in reviewing recent papers on gonorrhœa in relation to marriage and fecundity, gives prominence to the opinion of Schultz (*Monatschr. für Geb. u. Gyn.*, XXVII, 187). Heretofore, the most extensive figures had been those of Erb, supported by Yudin, who placed the danger of transmission and effect at 14 per cent. with certainty, and 13 per cent. with probability in the more or less acute stage, and 3.98 per cent. in the chronic stage. Schultz is more optimistic. He believes that "shreds" are not a conclusive proof of infectivity, and that 90 per cent. of such patients need not be advised against marriage. The other 10 per cent. should not marry, as they are still carriers of gonococci. Clinical differentiation of the two classes is difficult but not impossible. The number of men who infect their wives is placed at 4.25 per cent. of all those *who have ever had gonorrhœa*.

H. M. L.

BALLANTYNE, J. W. "The Rational Puerperium." *B. M. J.*, Jan. 1, 1910.

The author gives a very interesting review of the recent literature dealing with early rising in the puerperal period, calling attention to the interesting fact that Dr. William Goodell, of Philadelphia, in 1874, described the method of treatment followed in the Preston Retreat, with regard to early rising after labour, it being the custom to permit the patient to leave her bed the day after labour.

The author was also impressed by the fact that Kronig besides allowing the patients to rise early after labour had them carry out exercises directed toward strengthening the abdominal, gluteal and adductor muscles.

The author determined, therefore, to carry out in his puerperal patients in the Royal Maternity Hospital, at Edinburgh, during the autumn quarter, a system of bed gymnastics associated with early rising. Of 152 cases treated during the quarter, 107 carried out this regimen and were examined for muscular tone before leaving the hospital.

The so-called bed gymnastics were employed even in cases which had suffered considerable interference at the time of labour, though they were not commenced until the third or fourth day after delivery in these instances. The patients were allowed to assume the erect position earlier than usual. Forty-three rose on the 7th day, 38 on the 8th day, 19 on the 9th, 4 on the 10th, and 1 each on the 6th, 11th and 12th.

It was noticed that these patients did not experience any feeling of weakness in the limbs or dizziness such as is usually complained of.

It was noticed that this rising at the end of the first week in puer-

peral women resulted in a quickening of the pulse rate from 20 to 40 beats per minute, while at the same time the blood pressure was noted to fall from 4 to even 20 points, the change in the pulse rate being much more constant than that in the blood pressure. There was no mortality and absolutely no morbidity in the 107 cases in the subjects of these exercises. The temperature, in other words, never rose over 100° for more than one reading, and the pulse never passed 90.

The author found that displacement of the uterine organs occurred but rarely in these cases.

From his observations the author is inclined to conclude that it is permissible to reduce the period of rest after labour for the ordinary hospital patient to 8 or 9 days. Systematic bed exercises tend to keep the muscles in good tone and facilitate a return to the normal after the resumption of the erect posture. He is inclined to consider that the disturbance in the circulation evident on the assumption of the erect posture may have a recognizable effect upon the after health of the patient.

He thinks it is important that the normal cases should be distinguished from the morbid ones during puerperium, and, therefore, there are many cases in which there are contraindications to the performance of exercises in the horizontal position.

The author in these cases was in the habit of employing, besides the means already indicated, a pill containing sulphate of quinine and extract of ergot with an occasional addition of gr. $\frac{1}{4}$ or $\frac{1}{2}$ of digitalis folia.

DE ESTRE, MARCEL. "De la Différence de Température des Membres Inférieurs dans la Phlegmasia Alba Dolens," *Annal. de Gyn. et d'Obstet.*, January, 1910.

These observations were made at the instigation of Prof. Pinard at his clinic in Paris.

The author first examined twenty women in order to observe the difference of temperature in both the lower limbs during the puerperal period. It was noticed that the left thigh had a superficial temperature higher than that on the right side in 15 out of the 20 cases.

The temperature usually varied between 33 and 36° C.

Observations were then made upon 9 cases of phlegmasia alba dolens, either simple or double, and it was noticed that in every case there was an elevation of temperature of the affected limb, varying from 1 to 4° above that of the healthy side. This elevation of temperature tends to attain its maximum in the early period of the development of the phlegmasia, but it may be present throughout a period of from 25 to 45 days.

Five observations are then recorded upon women in which there was a suspicion of the development of phlegmasia. In all five cases in which there was a suspicion of phlegmasia there was a difference of temperature between the limbs of less than 1° C.

Thus, the author is led to formulate the following conclusions from his observations:—

1. In the healthy woman there is a temperature variation between the two lower limbs of from $1-10^{\circ}$ up to 1° C., but not passing this figure. The temperature usually varies between 33 and 36° C.

2. In a woman suffering from phlegmasia alba dolens, there is in the first days a difference in temperature of the lower limbs. This difference varies from 1 to 4° . In the affected limb the temperature is usually elevated above 36° C. This elevation of temperature may exist for several weeks, sometimes for several months.

3. In case of doubtful diagnosis of phlegmasia alba dolens the temperature of the lower limbs taken in the first days may permit the diagnosis of phlegmasia when the difference between the two members is shown to be over 1° for several consecutive days. This latter the author considers a constant sign, and, therefore, a valuable factor in diagnosis.

WILLINK, J. W. T. "Bloodless Enlargement of the Conjugata Vera."
Zeit. f. Gyn., No. 5, 1910.

In the Frauenklinik, at Amsterdam, the author has made use of a very simple procedure to increase the conjugata vera in labour.

With the object of bringing about marked lordosis in order to produce a condition similar to that obtained by placing the patient in the Walcher position, he placed under the patient's lumbar region, just above the glutei, a large pillow, which has the effect of raising the trunk of the body off the bed, thus leading to canting downwards and forwards of the symphysis pubis. In other words, a modified Walcher position is obtained.

Several cases are reported in which the author claims to have obtained an increase of $\frac{1}{2}$ cm. in the diagonal conjugate by this means, and in which as a result the head which had been arrested at the brim of the pelvis, rapidly passed this strait with a result that spontaneous delivery took place. In several instances the foetal head showed the impression of the promontory.

He concludes by stating that as a result of the employment of a pillow in the lumbar region as recommended, there is obtained in both primiparæ and multiparæ an increase in the conjugata vera of approximately 0.5 cm., which in many instances should lead to diminishing the length

of labour, and in a few cases may enable one to avoid resort to artificial methods of delivery.

In order that this method of treatment may be successful, one must be certain that the relationship between the pelvis and the foetal head is such as to permit the passage of the latter, and also the pains must be powerful and frequent.

SHAUTA, FREDERIC. "Ein Wort für den klassischen Kaiserschnitt."
Monat. f. Geb. und Gyn., January, 1910.

The author distinguishes three periods in the history of Cæsarean section:—the first, beginning with Trautmann, extends from 1610 to 1878: the second, the short Porro period, until 1892; and the classical period since Sanger. To these three periods apparently now a fourth can be added, that of the cervical Cæsarean section.

An interesting history follows concerning the development of Cæsarean section. At first Frank and Veit recommended their extra peritoneal Cæsarean section specially for infected cases. Later, they recommended it entirely for the non-infected cases; thus it replaces the classical operation.

He then compares the relative advantages and disadvantages of the extra peritoneal and the classical Cæsarean section, generally deciding in favour of the classical operation. He dwells particularly on the difficulty of being certain that the cervical operation is carried out absolutely without injury to the peritoneum, and reports that in 65 cases recorded, in 14 instances the peritoneum was torn in the course of its detachment from the uterine wall, and in three of the cases the bladder was wounded.

The author insists that Cæsarean section should be an operation which the practical physician may be able to carry out in general practice. This, he says, does not apply to the extra peritoneal operation which requires special skill if accidents are to be averted.

The author then raises the question if the classical Cæsarean section should be replaced by the extra peritoneal or cervical Cæsarean section in all uninfected cases, how can the gap be partially filled in at this time in the attempt to save the child in cases of contracted pelvis which are infected or unclean?

That extra peritoneal Cæsarean section in infected cases cannot further be employed appears, from the present state of affairs, to be pretty well established.

The primary object of Cæsarean section is the protection of the life and health of the mother. The question is then raised, as to whether this indication is met by extra peritoneal Cæsarean section in uninfected cases.

Particular stress is laid on the danger of infection of the cellular tissue as an objection to the operation, several cases of this nature being recorded from the author's personal experience.

Statistics, both French, German and English, are quoted showing that the mortality in cervical Cæsarean section lies between 7.3 and 8.0 per cent., while the morbidity, according to Jeannin, runs about 30.7 per cent. The foetal mortality runs somewhat over 8 per cent.

Shauta's statistics for classical Cæsarean section consist of 150 cases between the years 1885 and 1900, with 4 deaths, of which one only was due to sepsis, and 150 living children.

Comparison is then made between cervical Cæsarean section, craniotomy, and hebstectomy. He then states that all cases that have been examined with infected hands are to be excluded from any form of Cæsarean section.

He distinguishes on purely clinical grounds 3 classes of cases:—first, clean or uninfected; those which present themselves for operation before or immediately after rupture of the amniotic sac and only have been examined under strictest aseptic precautions. Second, protracted cases; such being cases in which the labour has lasted for a considerable time, and a certain amount of expulsive effort has been made, the amniotic sac having been ruptured, and cases which have been examined under doubtful conditions of asepsis. Third, unclean or infected cases; to which class is designated all cases which have been examined repeatedly, whether they have or have not fever, even those cases which at the time of observation show no evidence of manifest infection.

The author then proceeds to discuss the subject of hebstectomy referring to the fact that it is falling into a certain amount of discredit, which he thinks is due largely to its unwise employment. After dwelling on the dangers of operation, he states his own experience in 50 cases, in all of which the mother recovered. His custom was to allow all primiparæ to deliver themselves after the bones had been separated. Three children were born dead as a result of this method of treatment, the death being undoubtedly due to delay in the second stage. He is now of the opinion that the operation of hebstectomy is only to be undertaken in the case of multiparæ, and is to be followed by immediate delivery.

In his clinic, between 1892 and 1906, out of 5,288 cases of contracted pelvis, craniotomy was performed on living children 76 times, with one maternal death.

He then discusses the indications for extra peritoneal Cæsarean section, relegating to this operation those cases which have already undergone protracted labour and escape of the waters, the so-called protracted cases

in his classification. The operation he always combines with drainage of the cellular tissue.

He concludes by stating that in the first grade of pelvic deformity occurring in uninfected cases in primiparæ, classical Cæsarean section is the only operation indicated. In such conditions in multiparæ, besides this operation, hebstectomy may be resorted to as a matter of choice.

In protracted cases in primiparæ, extra peritoneal Cæsarean section with drainage must be resorted to, while in multiparæ hebstectomy is the operation of choice.

In infected cases craniotomy or delivery by means of Sellheim's abdominal fistula operation is possible.

In cases of marked deformity of the second grade, classical Cæsarean section is the operation of choice. In protracted cases extra peritoneal Cæsarean section with drainage, and in infected cases the Porro operation, total extirpation or delivery by means of Selheim's fistula operation.

The paper then concludes with a table indicating these operations in order.

ELLICE, McDONALD, M.D. "The Duration of Pregnancy with a New Rule for its Estimation." *Amer. Jour Med. Sc.*, September, 1910.

The author discusses the duration of pregnancy, reviewing the work of Tessier, Spenser and Winckel.

It is generally granted that pregnancy may be unduly prolonged with a result of large children, though it is conceded that large children may sometimes be the result of short pregnancies. The constitution and habits seem to have some influence in bringing about a prolongation of pregnancy.

Apparently the operation of ventro-fixation of the uterus seems to tend towards the prolongation of pregnancy, and the children in these cases are reported as being unusually large. "Missed labour" is not infrequently met with in these cases. The author gives a report of ten cases of ventro-fixation selected from literature, and considers that this subject requires further study.

Issmer estimates that the size of the fœtus bears a relation, as a rule, to the duration of pregnancy. Since the attempt to estimate the duration of pregnancy by the number of days is inexact, the author considers it might be well to attempt to estimate the duration of pregnancy by the size of the fœtus, arguing if the fœtus be measured and the average size of the fœtus is known, the date of labour will be when the fœtus arrives at the average size, in the great majority of cases.

He states that he has evolved a rule depending upon the height of the fundus of the uterus above the symphysis. He states that the height

of the fundus is dependent upon the occipitococcygeal measurement of the child, and varies in direct proportion to the weight of the child, as does the length.

The rule is as follows:—

The duration of pregnancy in lunar months is equal to the height of the uterus in centimeters divided by 3.5. It depends upon the regular growth of the uterus of 3.5 cm. each month of four weeks, and is very exact after the sixth month.

The measurement is taken with the patient in the dorsal position. One end of the tape is placed at the upper border of the symphysis, while the other end is held by the thumb in the palm of the hand. The fingers of the upper hand are held at right angles to the fundus of the uterus, and the tape follows the contour of the uterus save at the last dip.

He states that this method gives satisfactory results, and is the most exact means of the estimation of the duration of pregnancy. The so-called "sinking" of the fœtus in the last two weeks of pregnancy causes but little error in the measurement.
