and *Bacillus mycoides* (the latter as a type of a sporing organism). The method employed has been as follows:

A saline emulsion of an agar culture is made containing an approximately known number of organisms. Measured volumes of the emulsion and of acetozone solution (unfiltered) of known strength are mixed, kept at 37° C., and subcultured at certain time intervals. In some instances serum or broth has also been added to the mixtures. The following table shows some of the results obtained:

Staphylococcus Pyogenes Aureus.

SALINE MIXTURES.

Approximate number of organisms in mixtures = $2,000 \times 10^6$ per c.cm.

Strength of Acetozone in Mixtures.	Time of Exposure at 37° C.	Result.
1 in 1,750	1 hour 45 minutes	+
1 in 875	" "	+
1 in 5:3	30 minutes	-
1 in 437	24 hours	-
1 in 5:0	24 hours	-
1 in 872	24 hours	-
1 in 1,744	24 hours	-
1 in 4,370	24 hours	+
1 in 4,370	24 hours	-

This table shows that in saline mixtures acetozone 1 in 600 or thereabouts kills with an exposure of thirty minutes; and 1 in 4,000 or thereabouts kills with an exposure of twenty-four hours.

With an addition of one-third sterile human serum to the mixtures, acetozone 1 in 437 killed, and 1 in 654 did not kill, the staphylococcus with an exposure of twenty-four hours.

With an addition of one-third sterile nutrient broth to the mixtures, acetone 1 in 1,744 killed, and 1 in 4,370 did not kill, the staphylococcus with an exposure of twenty-four hours.

With sporing *B. mycoides* in saline mixture, acetozone 1 in 437 killed with an exposure of one hour. With an exposure of twenty-four hours, acetozone 1 in 1,744 killed, 1 in 4,370 did not kill.

With the addition of one-third serum to the mixtures, acetozone 1 in 437 with an exposure of twenty-four hours did not quite kill (there was no growth in the subcultures after twenty-four hours, but some growth after forty-eight hours' incubation). This was the highest strength tested.

With the addition of one-third sterile nutrient broth to the mixtures, acetone 1 in 1,744 killed, 1 in 4,370 did not kill, with an exposure of twenty-four hours.

We were able to make only one experiment with pus (staphylococci). Equal parts of pus and acetozone solution (giving 1 in 437 in the mixture) did not kill with exposures of 20 minutes, 40 minutes, 60 minutes, 1½ hours, and 18½ hours.

Finally a meat-broth anaerobic culture made from a septic wound was tested; it contained large numbers of mixed anaerobic sporing bacilli. Acetozone 1 in 290 with an exposure of twenty-four hours killed.

The results show that acetozone is a potent disinfectant. In saline mixtures it kills the staphylococcus in strengths of 1 in 600 in thirty minutes and 1 in 4,000 in twenty-four hours. The addition of serum and of broth reduce its germicidal power, but it is still effective in strengths of 1 in 437 and 1 in 1,744 respectively with an exposure of twenty-four hours.

With sporing *mycoides* in saline mixture it kills in strengths of 1 in 437 in one hour and 1 in 1,744 in twenty-four hours. With an addition of one-third serum 1 in 400 kills in twenty-four hours. With a mixed culture of sporing anaerobic bacilli grown from a septic wound, 1 in 290 killed in twenty-four hours. (1 in 290 = 30 grains to the pint; 1 in 437 = 20 grains to the pint approximately.)

We are much indebted to Miss Lettice Digby, assistant in the laboratory, Military Hospital, Richmond, for the care and labour she has devoted to the conduct of the experiments.

At a meeting of the medical profession held in Osler Hall, Baltimore, on May 23rd, £28,560 was subscribed for Liberty Loan bonds.

THE number of past and present students of St. Thomas's Hospital serving in connexion with the war up to August 8th was 972, of whom 39 have been killed in action or died on service, 60 have received British honours, 10 have received foreign honours, and 3 the Order of the Hospital of St. John of Jerusalem, while 101 have been mentioned 146 times in dispatches and for valuable services.

THE BACTERIOLOGICAL EXAMINATION OF THE BLOOD IN CASES OF IRRITABLE HEART.

BY

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AND

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(Report to the Medical Research Committee.)

In the BRITISH MEDICAL JOURNAL of November 13th, 1915, a letter was published which intimated that organisms had been found in the blood of patients complaining of the symptoms associated with the condition known as "irritable heart," namely, breathlessness on slight exertion, palpitation on excitement or moderate exercise, giddiness and sometimes fainting, precordial pain and a general lassitude. Further investigation showed that the first conclusions were not warranted. The following note gives the results of the blood examinations in two series of patients. The first series was examined at University College Hospital, the second at the Hampstead Military Hospital, Mount Vernon.

First Series.

In all, 92 cultures from 27 patients were examined. The first 32 cultures gave only one positive result, a Gram-positive micrococcus in pure culture. The organism grew in minute colourless colonies, and had to be frequently subcultured, as it died out in three or four days. It was difficult to class it either as a streptococcus or as a staphylococcus. In a hanging drop short chains of three and four could be seen, but diplococci were most common. In a film short chains of three and four could be seen, but the arrangement on the whole was staphyloid. The colonies remained minute after several subcultures. The organism, incubated at 37° C., produced acid when grown in saccharose, lactose, raffinose, inulin, salicin, mannite, and litmus milk. There was no liquefaction of gelatin at 20° C. The remaining 60 cultures of this series gave 8 positive results at a temperature of 37° C., and 14 positive results in duplicates incubated at a temperature of 20° C. The majority of the cultures produced a micrococcus similar in type to that described above, but some showed a bacillus.

Such a high percentage of positive results raised the question of contamination, and the suspicion was increased by the larger number of growths found in the duplicates incubated at 20° C. A series of control blood cultures in normal people was therefore undertaken. Twenty-four cultivations were made; cocci or bacilli were found in four instances. Tentative cultures made from the skin and the syringe, after sterilization, showed that the method used to sterilize the syringe was faulty. The syringes had been sterilized by drawing up into the barrel, three to six times, oil heated to 140° C., according to the method recommended by Sir A. Wright.²

Subsequent experiments³ showed that syringes may not be rendered sterile even by six syringefuls of oil heated to 140° C. A satisfactory method of sterilizing syringes was found to be as follows:

An all-glass syringe is fitted together with the needle attached. Alcohol is drawn through to ensure the absence of moisture. The piston is withdrawn about a quarter of an inch to prevent it adhering to the neck of the barrel after heating. The syringe is placed in a large test tube with a wool pad at the bottom, and the tube is plugged with wool. The whole is placed in the hot-air sterilizer, and the temperature raised gradually to 160° C. and kept at this height for fifteen minutes. The air is allowed to cool gradually, and the syringe is ready for use as soon as it is cool. It need not be handled or exposed to the air until the moment of employment. This method of sterilization was controlled by contaminating the syringes with known organisms. It was found that all organisms tested, including the spores of *B. subtilis*, were killed by this treatment. In the second series of observations this method of sterilizing the syringes was used.

Second Series.

The patients in this series were of the same type, and presented the same clinical syndrome as those in the first series. The skin was sterilized by lysol or sublimate, 1 in 1,000. Alcohol and ether were subsequently employed. The blood was taken from the median basilic vein. Various methods of cultivation were used:

(a) 4 c.cm. of blood were taken and distributed between four tubes, each containing 10 c.cm. of broth. (b) 6 c.cm. of blood were distributed between twelve tubes, each containing 10 c.cm.

of broth. (c) 10 to 15 c.cm. of blood were poured into flasks containing 100 c.cm. of bouillon with 1 per cent. saponin. This method had to be given up owing to the difficulty of excluding air organisms. (d) Blood was poured directly on to the surface of agar plates incubated at 37° C., and also at room temperature. (e) 2 c.cm. of blood were put into a sterile test tube, incubated for twenty minutes at 37° C., and then at room temperature for one hour. The serum was pipetted off, and 10 c.cm. of broth were added to the tube containing the clot. The tube was replaced in the incubator at 37° C. Other media employed were: 1 per cent. saponin broth, 1 per cent. sodium taurocholate broth, 1 per cent. sodium glycocholate broth, 1 per cent. sodium citrate, 0.9 per cent. saline, and media containing adsorbents—aluminium hydroxide, animal charcoal, iron hydroxide. Anaërobic methods were also employed. The cultures were kept for ten days or a fortnight and frequently subcultured.

In all, 96 observations were made on 43 cases. In no instance was any organism grown, except in the few cases which became contaminated by organisms from the air when the flask method was used.

Since the patients were of the same clinical type we may collate the findings in the two series. In the second series, when the methods of sterilization were controlled, the results were consistently negative; it may therefore be assumed that the positive results obtained in the first series were due to contamination. Using the methods of cultivation in general vogue we have failed to demonstrate the presence of bacteraemia in cases of "irritable heart," and must therefore conclude that bacteraemia does not play a demonstrable part in the pathology of this disease.

We wish to express our thanks to Captain H. S. Blackmore, R.A.M.C., for the help he gave in carrying out the first part of the investigations at University College Hospital.

REFERENCES.

- ¹ T. Cotton, T. Lewis, and F. H. Teale: A Note on the "Irritable Heart" of Soldiers. ² *Technique of the Teat and Capillary Tube*, p. 194. ³ *Journal of the Royal Army Medical Corps*, October, 1916, p. 522.

TRAUMATIC RUPTURE OF THE SPLEEN.

BY

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TRAUMATIC rupture of the spleen is rare in this country. The two following cases, which occurred within seven months, are worthy of record:

CASE I.

W. T., male, aged 24, had been acting as a dispatch rider in Egypt, where he had attacks of malarial fever.

On December 18th, 1915, at 1.30 p.m., he was riding his motor bicycle, when he collided with another. The impact was sufficient to throw him forward thirty yards. He was stunned, and, when picked up, was taken home and attended by Dr. Griffiths at 2 p.m. I saw him at 9 p.m. He was blanched; the pulse was 128; the abdomen was distended and immobile and dull in the flanks.

At 9.30 p.m., under a general anaesthetic, an incision was made through the left rectus. Five pints of bright blood and some clots were removed from the peritoneal cavity. The spleen was enlarged to three or four times its natural size and an irregular laceration could be felt on its upper surface. At this juncture the patient became so collapsed that it was impossible to entertain the removal of the spleen. Gauze was packed into the laceration, the lower portion of the wound was closed, and the patient returned to bed.

He rallied during the night. There was no further haemorrhage. He was given calcium chloride gr. xv every four hours. He remained much in the same condition until December 23rd, when he gradually sank and died, five days after the accident.

CASE II.

J. M., male, aged 14, working on a farm, on July 15th, 1916, at 9.30 p.m., was running down a bank, when he caught his foot in some fern roots and fell on an ant-hill. He states that he hurt himself so much that he lay there for half an hour before he was able to get up and walk home, a distance of only fifty yards. The pain was in his left testicle and there was a swelling on the left side of the scrotum. He vomited three times after he reached home. His mother put some fomentations on him. The next morning he was seen by Dr. Deacon, who ordered him into the Kidderminster Infirmary.

He arrived at 2 p.m.; he had been driven fifteen miles in a two-wheel trap and was sitting up by the driver and appeared to be well. He got down and walked to the ward. He was said to be suffering from a hernia. I saw him at 3 p.m. He did not appear to be ill; the temperature was 97° and the pulse 106. There was no swelling in the scrotum, but when he coughed there was a protrusion from the abdomen into the scrotum, which was easily returned. It felt like a portion of omentum

with some fluid. He denied any sign of a hernia previously. The abdomen was not distended, the movements were free, and there was no rigidity. There was some dullness in both flanks.

At 3.30 p.m., under a general anaesthetic, an incision was made for radical cure of left inguinal hernia. The sac was isolated; before applying the ligature it was opened, when a quantity of blood poured out; the operation for radical cure was completed. The abdomen was opened by an incision through the left rectus. About two pints of blood and clots were removed from the peritoneal cavity. The spleen was felt to be lacerated. It was lifted out and the pedicle tied. The cavity was sponged out and the wound closed in layers. The spleen weighed seven and a half ounces, and was lacerated in four places.

The patient bore the operation well. He gradually improved and the wounds healed. He had an attack of acute parotitis at the end of August, which delayed his recovery, but he was discharged on October 5th. He looked well, and did not appear to suffer any ill effect from the loss of the spleen. He is now at work again and enjoying his usual health.

The contrast between these cases is interesting. The first patient had an enlarged spleen, which predisposes to rupture. The violent nature of the accident was sufficient to make us suspect a serious injury. Although the operation was performed eight hours afterwards, the loss of blood was so great that the patient was unable to recover from it. This result was favoured by the concussion, which prevented a sufficiently early recognition of the abdominal condition. Although it was not possible to remove the spleen this did not affect the result, as there was no further haemorrhage. In the second case the spleen was of normal size, and there was no predisposing cause of rupture. The accident was not severe, and did not make us suspect a serious injury. Although the operation was not performed until eighteen hours afterwards, the loss of blood, though serious, was not sufficient to prevent recovery. If the hernial sac had not been opened the condition might not have been discovered, as it was obscured by the sudden appearance of a hernia and by the moderate nature of the constitutional symptoms. It is difficult to believe that a boy could sit up in a shaking trap and drive fifteen miles over a very hilly road with such severe injuries.

A CASE OF "SPONTANEOUS" RUPTURE OF THE SPLEEN: SPLENECTOMY: RECOVERY.

BY

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THE case is published for two reasons, first, on account of the rarity of rupture of the spleen as an abdominal catastrophe in this part of the world, and secondly, so that medical officers may be reminded of the necessity of examining the spleen in cases who have served for a period abroad.

I am indebted to Lieut.-Colonel Hayes, R.A.M.C., for his permission to publish the notes on this case.

Pte. P., aged 26 (service seven and a half years), was admitted to No. — General Hospital on March 29th, 1917.

He complained of acute abdominal pain and was cold, collapsed, somewhat cyanosed, and without any perceptible radial pulse. The abdomen was not rigid. There was dullness in the left flank. The liver dullness was present and normal. The patient had an "appendix" scar in the right iliac fossa. A lung lesion and locomotor ataxia having been excluded the case seemed clearly an acute abdomen, though its nature was doubtful. Marked cyanosis of the finger-nails was noted, and Colonel Hayes suggested the spleen as the focus of mischief, when the patient remarked "that some had said malaria was his trouble."

Operation.

Immediate middle-line laparotomy was performed. Captain Frew, R.A.M.C., gave the anaesthetic, and Captain F. T. Hill, M.C., R.A.M.C., assisted. On opening the peritoneum free blood was at once found. The wound was enlarged, and a very big spleen was quickly delivered through it. The capsule of the spleen was torn, and the torn surface was covered with firm clot. The pedicle was clamped and the spleen removed; the vessels were secured with a Staffordshire knot. Nearly two pints of blood were then wiped out of the pelvis and the kidney pouches; when the peritoneum was clean, the abdomen was closed with through-and-through silk-worm-gut stitches. Salines, morphine, and stimulants aided the rallying of the patient. His wound healed well, and surgically he made a good recovery.

The blood examination showed the parasite of malaria present in very great numbers. No crescents were found, and,