regurgitation.—This was a patient aged twenty-eight years. On Nov. 11th the hæmoglobin amounted to 100 per cent. and there were œdema of the legs and ascites. On Dec. 12th the hæmoglobin was 97 per cent., and the ascites and œdema had disappeared.

CASE 3. *Mitral stenosis (ulcerative endocarditis).*—This was a patient aged forty-one years. On Nov. 11th the hæmoglobin was 105 per cent., and there was much œdema. On Nov. 24th the hæmoglobin had risen to 110 per cent.; there was still much œdema, and the patient died on Nov. 27th.

CASE 4. *Bronchitis with heart failure.*—This was a patient aged twenty-three years. On Nov. 18th the hæmoglobin amounted to 97 per cent., and there were œdema and ascites. On Dec. 7th the hæmoglobin was 90 per cent., and the patient was in the same condition and died on Dec. 8th.

In nearly all cases it was found that the number of corpuscles was increased to a greater extent than the hæmoglobin, so that the corpuscles themselves contained less hæmoglobin than normal.

It will be seen that these results lend no support to the view that failure of compensation is attended by a condition of plethora. They tend rather to show that the amount of blood in the circulation is subnormal, unless we adopt the unlikely supposition that the defective aeration of the blood in this disease acts like mountain air, in stimulating the production of red corpuscles and hæmoglobin. We must, therefore, conclude that there is no condition of the plethora, hydræmic or otherwise, in heart disease, and that the lowering of the specific gravity of the whole blood is due to a diminution of solids of the plasma, and possibly also of the corpuscles—i.e., there is hydræmia, but no plethora. Since the volume of the fluid contained within the vascular system is not increased, the only factor which can contribute to the raising of the mean systemic pressure, and a consequent production of a rise of pressure in the peripheral veins and capillaries by failure of the heart-pump, is the active vascular constriction caused by the anæmia of the vaso-motor centre. We have already studied the limits of a rise of systemic pressure so produced, and have seen that it is inadequate to bring about a rise of capillary pressure in the limbs when the heart fails. We must, therefore, conclude that the ordinarily accepted notion is erroneous which assumes that the pressure in the capillaries and veins all over the body in uncompensated heart disease is raised. The pressure must in these situations follow the arterial pressure, and thus be lowered. The only parts of the body where there can be a rise of pressure in heart disease are the capillaries of the liver (whence the well-known "nutmeg" liver of this disorder) the great veins near the heart, and possibly in the system of capillaries which surround the tubules of the kidney. In the limbs, and probably in the abdominal viscera other than those just mentioned, the capillary pressure will be lower than in the normal individual.

For many years, and, indeed, since the time of Richard Lower, we have been wont to pride ourselves on our exact understanding of the factors responsible for the production of anasarca and ascites in heart disease, and have confidently ascribed the increased serous exudation to the rise of pressure in the capillaries due to the transmitted backward pressure from the incompetent heart, and the dropsy of heart disease is generally regarded as affording striking support to Ludwig's filtration hypothesis of lymph formation. The whole argument is, however, based on the false assumption that there is a rise of pressure in the smaller veins and capillaries in heart disease; whereas, as I have just shown, the reverse is the case. We must, therefore, seek for some other explanation of the dropsy in this disease.

VICTORIA HOSPITAL, SWINDON. — The ninth annual meeting of the Victoria Hospital, Swindon, was held on Feb. 13th. The report of the general committee showed the total expenditure for the past year to have been £419, against receipts amounting to £500; the sum of £107 was due to the treasurer on account of the building and furnishing fund. There were 153 patients admitted in 1896, against 131 in 1895, the average cost of each being 2s. 11½d. daily. The committee suggested that the celebration to be held in Swindon on account of the Queen's long reign should take the form of raising funds for the benefit of the hospital.

A SUCCESSFUL CASE OF INTRAVENOUS INJECTION OF SALT SOLUTION AFTER LAPAROTOMY IN A CASE OF RUPTURED TUBAL GESTATION.

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On April 20th, 1896, I was called in by Dr. Fennell of Dalston to see a married woman, aged thirty years, when the following history was obtained. She had been married nine years and had had four children, the last nineteen months previously. There had been no miscarriages. Instruments were used at the first confinement, but not at the others. She generally got up ten days after her confinements, but after the last confinement she was in bed nearly two months on account of what the medical attendant told her was peritonitis. Menstruation was quite regular up to Feb. 26th, 1896, but she "saw nothing" in March. She took some pills on April 4th with a view to bringing on the period; these gave her great pain. On April 6th a vaginal discharge containing blood began, and she had been losing blood more or less ever since up to the day when I first saw her (April 20th). The patient said that a solid substance came away from the vagina on April 11th when passing urine. She had had some pain in passing urine and had suffered from constipation since April 6th. She said that she had had pain at the lower part of the abdomen, especially over the left iliac region, for some days before I saw her, and there was an especially sharp attack of pain on the early morning of April 20th. On examination of the abdomen there was some resistance in the left iliac region and some tenderness there. The breasts did not appear active. On vaginal examination there was a little blood to be seen about the external parts. The uterus was anteverted and slightly flexed and distinctly larger than normal, although the sound only passed three inches. A swelling was felt behind and to the left of the uterus occupying the left posterior quarter of the pelvis. It was distinctly elastic and could be displaced a little by upward pressure. The case appeared to me in all probability to be one of extra-uterine pregnancy. The question arose as to whether the substance passed by the patient a few days before I saw her might not have been an ovum, and the case one of ordinary miscarriage, with possibly some peri-uterine inflammation; but, on the whole, it seemed to me much more probable that the case was really one of tubal pregnancy, and that the substance in question said to have been passed, if anything more than a clot, was probably a decidual cast of the uterus. The arrangements of the patient's home were not very convenient for performing abdominal section, and accordingly I had her removed to the London Hospital, where she was admitted under my care on April 21st.

Operation.—On April 23rd she was anaesthetised with the A.C.E. mixture; the abdomen was opened in the usual way and was found to contain blood and masses of clot. The left Fallopian tube was considerably enlarged and had ruptured. The left ovary contained a large corpus luteum with a well-marked yellow convoluted border. The uterine appendages on the right side were also slightly enlarged, and the uterus was considerably enlarged. The appendages on both sides were removed in the usual way and the peritoneum well washed out with saline fluid. A Keith's tube was inserted and the rest of the abdominal incision was closed. When this had been done it was observed before the dressing was put on that the Keith's tube had become full of dark blood. This was withdrawn once or twice, but the tube very soon became again full of blood. The abdomen was therefore re-opened to discover the source of the bleeding; the stumps of the broad ligaments were pulled up and inspected, but no blood was coming from them. On looking at the back of the uterus there were some quite superficial tears in the peritoneal coat near the level of the internal os, from which blood was coming rather freely. Several attempts were made to control this bleeding by passing silk ligatures on a curved needle under the tissues at the bleeding point and tying, and also by applying Wells's forceps; but the tissues were so friable that the more manipulation took place in the neighbourhood of the tears

the worse the bleeding became. I therefore decided to perform supra-vaginal hysterectomy; the uterine arteries were ligatured on each side outside the uterus, and then the body of the uterus was cut away. A large pair of Wells's forceps was left on, but the surface of the stump oozed rather freely, and two silk ligatures were passed right and left from before backwards and tied firmly to check it. Some iodoform gauze was packed over the stump, a small piece being left sticking out at the lower end of the wound. A Keith's tube was inserted and the remainder of the wound closed in the usual way. The re-opening of the wound and the various measures that were required to permanently control the bleeding had occupied a considerable time, and, besides, a good deal of blood had been lost, taking into consideration what was extravasated in the abdomen by the extra-uterine sac before operation, and also reckoning the amount that was lost from the superficial tears on the back of the uterus. How these were produced I am unable to say positively. My impression is, however, that some of the masses of clot removed were partially adherent to the uterus, and that in removing them the peritoneal coat of the uterus must have been slightly torn, and then the tissues were so friable that almost any kind of manipulation—sponging, pulling up the uterus, and the like—seemed to increase the laceration and the hæmorrhage. At all events, at the end of the operation, when the patient was put back to bed, her face was quite white, her hands and feet quite cold, and no pulse could be felt at the wrist; and I have no doubt whatever that had she been left without further treatment she would certainly have died, probably without regaining consciousness at all. I decided, however, to try the effect of injecting salt solution into the veins. Our stock of boiled water had been exhausted in washing out the abdomen during the operation, so that the water used in making the salt solution for intravenous injection was merely the water out of the kettle and out of the tap. The salt solution, however, was sterilised, because we keep a concentrated solution of it which is carefully prepared and boiled before each operation. A glass reservoir was filled with salt solution at the temperature of 100°F. and containing a drachm of common salt to each pint. The injection was made into the median cephalic vein of the left arm, the necessary pressure being obtained simply by hanging up the glass reservoir on the wall about three feet above the patient's head. After one pint had been injected the patient's pulse at the wrist could be felt. After four pints had been injected the pulse was as good as it had been before the operation. The patient made a good recovery. I have seen her several times since she left the hospital; the abdominal wound is soundly healed, and she remains quite well.

Harley-street, W.

ON THE APPLICATION OF THE SERUM TEST TO THE DIFFERENTIAL DIAGNOSIS OF TYPHOID AND MALTA FEVER,

AND ON THE FURTHER APPLICATION OF THE METHOD OF SERUM DIAGNOSIS TO THE ELUCIDATION OF CERTAIN PROBLEMS IN CONNEXION WITH THE DURATION OF IMMUNITY AND THE GEOGRAPHICAL DISTRIBUTION OF DISEASE.

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It is notorious that every clinician in tropical and sub-tropical countries is constantly meeting cases of continued fever of which he finds it impossible to say whether they are cases of typhoid fever, of Malta fever, of malarial fever, or of some other (possibly as yet undescribed) variety of continued fever. In cases of this kind, and further in cases where it is desirable that a diagnosis should be arrived at early in the course of the disease, the prompt and accurate methods of diagnosis which medical research has recently placed at our disposal will be everywhere welcomed. Three of such methods of diagnosis are at present available. In the

first place, the blood may be examined microscopically with a view to determining the presence or absence of pathogenic micro-organisms. This method is of particular utility in connexion with the determination of the presence or absence of the micro-organisms of malaria and of spirillum fever. In the second place, the excretions (and, in particular, the urine¹) may be examined by appropriate cultivation methods with a view to determining the presence or absence of pathogenic micro-organisms. This method is applicable to typhoid fever. It is probably also applicable to Malta fever. Lastly, the method of serum diagnosis may be applied. By this method the blood of a patient who is suffering, or who has suffered, from a continued fever is tested in turn with any pathogenic micro-organisms that may be available, and in particular with the micro-organisms which are causally associated with typhoid fever and Malta fever. We have recently been applying this serum test to the diagnosis, and especially to the after-diagnosis, of tropical and sub-tropical continued fevers. Convalescents from these fevers come under observation in Netley in the persons of soldiers and others who are invalided home from military stations abroad.

METHODS.

Blood is readily obtained in sufficient quantities from the finger tip by puncturing the back of the finger near the nail. It is then drawn off into a pipette, such as is represented in Fig. 1. This pipette is converted into a blood capsule by sealing it in the flame at the points indicated in the figure by the letters *xx*. After twenty-four hours, or as soon as the blood has duly separated into serum and clot, the ends of the blood capsule are broken off and the separated serum is drawn off by a capillary pipette, as indicated in Fig. 2. The amount of serum which is drawn off is indicated by placing a mark *y* on the outside of the capillary pipette. The serum is then blown out into a watch glass and is diluted first fivefold by filling up the capillary pipette four times in succession with normal salt solution and by blowing this salt solution out into the serum in the watch glass. In this manner any desired dilutions are obtained. It is convenient to make 5-, 10-, 25-, 50-, and 100-fold dilutions of each sample of serum.

Having diluted the serum in this manner a small quantity of the diluted serum is allowed to run up into the sedimentation tube² represented in the diagram by Fig. 3. For the sake of clearness let it be supposed that diluted serum has been allowed to run up the tube to the point indicated by the letter *a* in Fig. 3. This point is now indicated on the outside of the sedimentation tube by a red mark. Having filled in the tube in this manner with the desired amount of diluted serum, the point of the capillary pipette is now turned upwards, so as to admit a bubble of air into the point of the capillary pipette. The diluted serum now occupies the position indicated in Fig. 3 by the space *c* to *d*, the bubble occupying the space between the letters *b* and *c*. Having thus introduced our bubble of air, which is to serve the purpose of an index, the end of the capillary pipette is immersed into a perfectly fresh emulsion made from a young culture of either typhoid or, as the case may be, Malta fever bacteria. The emulsion is allowed to run in until it reaches the point *a*. We have now introduced an equal quantity of diluted serum and of typhoid or Malta fever emulsion into our sedimentation tube. The next step is to mix the bacterial emulsion with our diluted serum. This is easily done by aspirating by means of the india-rubber tube *T* the contents of the capillary pipette two or three times in succession into the mixing chamber *z*. Having thus obtained an intimate mixture of an equal portion of the diluted serum and of the bacterial emulsion, we blow the contents of the tube down into the stem of the pipette, taking care not to blow it down too near the end of the pipette, and we seal the point of the pipette in the flame. We then label the capillary pipette 1 in 10, if we have mixed an equal volume of 5-fold diluted serum with a bacterial emulsion; 1 in 20, if we have employed a 10-fold diluted serum, and so on. We then put up a control tube of the bacterial emulsion

¹ The importance both from a diagnostic and a hygienic point of view of recognising the presence of typhoid bacilli in the urine was pointed out in a paper which was written by one of us in conjunction with Surgeon-Major Semple (THE LANCET, July 27th, 1895). The results which were arrived at in that paper have been recently confirmed and somewhat extended by Dr. P. Horton Smith (Royal Medical and Chirurgical Society, Feb. 7th, 1897).

² Mr. A. E. Dean, jun., 73, Hatton-garden, E.C., is, at my suggestion, making sero-sedimentation tubes of stout glass. Provision is made in these tubes for preventing the escape of the contents when the tubes are placed upright so as to allow of sedimentation.