patients. To his knowledge he had never passed blood. An examination of the abdomen revealed some pain on pressure over the affected area and the stomach gave signs of being considerably dilated, extending an inch below the umbilicus and laterally as far as the left axillary line. The heart manifested a marked mitral murmur. The other organs appeared to be healthy. He had lost flesh considerably, his weight being 9st. 4lb. While in the medical ward he was treated with the usual gastric remedies and his stomach was washed out from day to day. As no improvement followed he was removed to the surgical ward. On Nov. 9th, 1898, he was admitted to Ward 3 under my care with the object of having an exploratory operation performed upon the stomach.

The abdomen was opened by a three- to four-inch incision above the umbilicus and the anterior surface of the stomach together with the pylorus were examined with the finger. Nothing of the nature of adhesions or other complications were detected. The stomach was then partially withdrawn through the parietal wound and its anterior wall was incised for about an inch in the long axis of the organ and about midway between its two curvatures. The pyloric orifice and the interior of the stomach were examined with the index-finger, but here also the result was negative. No constriction or thickening was felt at the pylorus, the apex of the finger being admitted easily into the opening. The internal lining of the organ, as far as it could be investigated, also appeared to be normal; there was no thickening or ulceration. The exploratory incision was then closed by a continuous Lembert suture and steps were taken to lessen the dilated stomach. After withdrawing the organ to as great an extent as possible a longitudinal fold in the anterior wall was tucked in and the two curvatures were approximated and secured by a series of interrupted Lembert sutures. The stomach was then returned and the abdominal parietal wound was closed by three separate rows of stitches—peritoneal, aponeurotic, and skin. The operation lasted 55 minutes.

After the operation the patient continued to vomit small quantities of blood-stained mucus and he complained of some pain in the epigastrium. At about 1 A.M. the next day he vomited something like eight ounces of pure blood. From that time onwards till 10 A.M. it was computed that he brought up at least 35 ounces of blood. His condition when seen by me was such as to indicate free hæmorrhage into the stomach from the gastric wound and the necessity of immediate removal of the patient to the theatre. An anæsthetic was administered and the exploratory incision into the stomach was at once exposed by the removal of all stitches. It was then found that some small veins were bleeding at the margin of the incision. These were secured, the edges of the mucous membrane were stitched together, and a continuous Lembert suture was applied to the peritoneal coat. The gastric plication was re-sutured and the abdominal wound was re-closed. The median cephalic vein was now opened and three pints of hot normal saline solution were injected. The pulse and respiration at once commenced to improve. Finally, the patient's stomach was freely washed out, much blood-clot being thus removed. From this period onward uninterrupted improvement took place and he left the infirmary about two months later for the convalescent home at Largs. On Feb. 10th, 1899, he came to the infirmary to report himself. He had put on flesh, was feeling strong, was quite free from his old pain, and was taking his food well. When last seen on March 15th the improvement had still continued and his weight then reached 11st. 4lb. against 9st. 4lb. when he left the infirmary.

In reviewing the case and its treatment it will be observed that the operation verified the diagnosis of a dilated stomach and, further, that it proved the absence of any gross lesion which could explain the dilatation. This latter information paved the way for the treatment adopted. The case was then taken as one dependent for its symptoms mostly upon an unduly enlarged stomach, the lessening of the cavity of which might afford the relief required. Accordingly gastrorrhaphy was performed. A considerable fold of the anterior wall of the stomach was tucked in and secured by stitches. The untoward result which immediately followed of excessive hæmorrhage into the stomach from the gastric wound must be looked upon as a very unusual and unfortunate but perfectly preventable accident in the performance of the operation. Rather let it be taken as showing how much can be done upon the stomach without any ultimate

ill result, for this patient practically underwent two consecutive operations upon the same region.

It would unduly lengthen my remarks did I attempt to dilate upon the particular operation performed in this case. I have introduced it simply as a basis for the larger and wider discussion of gastric exploration. The diagnosis and treatment of unobstructive dilatation of the stomach by operation is merely one aspect of the question and that neither the most important nor, it might be added, the most commendable, because although several successful cases have been reported sufficient time does not yet appear to have elapsed to ensure that the relief at first obtained has proved lasting. With regard to the case shown this evening I can only say that the man has been greatly relieved from his original trouble, he has lost his old continuous pain, he enjoys his food when taken with proper precautions, and he has gained greatly in weight and strength. Whether this general improvement will be lasting it is impossible to say, but I think that it may be fairly concluded that but for the exploratory gastrotomy there is little reason to believe that the apparently true cause of his trouble could have been determined or the proper treatment employed.

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EXPERIMENTS WITH PANE'S ANTI-PNEUMOCOCCIC SERUM.

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AN anti-pneumococcic serum was first prepared on a large scale by one of us in February, 1897.¹ This serum was obtained by injecting a pony with increasing doses of cultivations of the pneumococcus. The potency of the serum was tested by mixing varying quantities with a ten-fold fatal dose of a living cultivation of the pneumococcus and injecting the mixture into the peritoneal cavity of a rabbit. It was found that 0.03 cubic centimetre of the serum was the smallest quantity which, when tested in this way, protected the animal from death. Animals which had already been infected could be cured by injecting larger quantities of the serum, provided the treatment was adopted not later than in the first quarter of the disease. The serum was thus shown to possess a distinct therapeutic action.

Two cases of pneumonia which were successfully treated with the serum were recorded in the above-mentioned paper and others have been reported in the journals. A full account of the action of the serum and of the method of standardising it appeared in a later paper by us conjointly.² The pony after a time, in spite of further injections, ceased to yield a potent serum, so that we were unable to make further trials of its efficacy in the treatment of pneumonia.

On March 14th, 1897, Dr. Pane brought forward a communication upon Anti-pneumococcic Serum before the Medico-Chirurgical Academy of Naples, which was also published in the *Centralblatt für Bakteriologie* of May 27th, 1897. In this communication he gave an account of sera which he had obtained by immunising a cow and a donkey and which he had used in the treatment of pneumonia. Since then he has continued his researches and is now supplying the serum in large quantities. The present serum is obtained from donkeys and is of two qualities, No. 1 and No. 2. Of these No. 1 is stated to be of such a strength that one cubic centimetre neutralises in the rabbit 1000 fatal doses of the pneumococcus, while No. 2 neutralises 3000 fatal doses.

Through the kindness of Dr. T. J. MacLagan we obtained a sample of No. 2 serum which we have tested in order to ascertain whether it would exert the same protective influence upon our cultivations of the pneumococcus as upon those used by Dr. Pane. The results of our experiments are here recorded.

The method of mixing the serum with the cultivation and injecting the mixture into the peritoneal cavity of a rabbit

¹ Washbourn, Brit. Med. Jour., Feb. 27th, 1897.

² Further Researches upon the Pneumococcus, Journal of Pathology, January, 1898.

was found to be unreliable on account of the addition of an antiseptic to the serum for preservative purposes. The antiseptic used is 0·25 per cent. of trikresol which when mixed with a living cultivation of the pneumococcus is sufficient to destroy its virulence, as is shown in Table I. We there-

TABLE I.

Rabbit No.	Dose of pneumococcus.	Dose of serum.	Method of Inoculation.	Result.
1	0·00001 loop*	—	{ Intra-peritoneally. }	Died in 36 hours from pneumococcic septicæmia.
2	0·0001 „	1 c.c. serum.	do.	Living.
3	0·0001 „ {	1 c.c. trikresol (0·25 % solution).	{ do.	Living.

* Of a blood agar cultivation.

fore employed the method of injecting the serum into the circulation and immediately afterwards inoculating the cultivation into the peritoneal cavity, thereby excluding the direct action of the antiseptic upon the cultivation.

In Table II. are recorded preliminary experiments to ascertain whether the serum exercised any protective action against our cultivation of the pneumococcus.

TABLE II.

Rabbit No.	Dose of pneumococcus.	Dose of serum.	Result.
4 {	0·000001 loop* { intra-peritoneally }	—	{ Died in 36 hours from pneumococcic septicæmia. }
5 {	0·00001 loop* { intra-peritoneally }	—	{ Died in 24 hours from pneumococcic septicæmia. }
6 {	0·0001 loop* { intra-peritoneally }	2 c.c. intra-venously.	{ Living. }

* Of a blood agar cultivation.

In Table III. are recorded experiments to ascertain what multiple of the minimal fatal dose of cultivation one cubic centimetre of the serum would protect against.

TABLE III.

Rabbit No.	Dose of pneumococcus.	Dose of serum.	Result.
7 {	0·000001 loop* { intra-peritoneally. }	---	{ Died in seven days. Post mortem there were fibrinous peritonitis and pericarditis. From the blood a few colonies were cultivated, although none could be detected microscopically. }
8 {	0·00001 loop* { intra-peritoneally. }	---	{ Died in 30 hours. Post mortem blood was crowded with pneumococci. }
9 {	0·0001 loop* { intra-peritoneally. }	—	{ Died in 30 hours. Post mortem the blood was crowded with pneumococci. }
10 {	0·0001 loop* { intra-peritoneally. }	1 c.c. intravenously. }	{ Living. }
11 {	0·001 loop* { intra-peritoneally. }	1 c.c. intravenously. }	{ Living. }
12 {	0·01 loop* { intra-peritoneally. }	1 c.c. intravenously. }	{ Living. }
13 {	0·1 loop* { intra-peritoneally. }	1 c.c. intravenously. }	{ Died in 60 hours from pneumococcic septicæmia. }

* Of a blood agar cultivation.

Inasmuch as rabbit No. 7, inoculated with 0·000001 of a loop, did not die until seven days after inoculation we consider 0·00001 of a loop as the minimal fatal dose. Consequently one cubic centimetre of the serum protects against at least 1000 fatal doses of our pneumococcus and

more might be claimed for it. According to Dr. Pane it protects against 3000 fatal doses of his pneumococcus, so that his results and ours practically coincide.

These experiments are of special interest in showing that the serum will protect against pneumococci obtained from two different sources. We hope shortly to publish further observations in this direction. From our previous experience of anti-pneumococcic serum and from the cases published by Dr. Pane we feel justified in anticipating that further successes will be obtained in the treatment of pneumonia and other pneumococcal affections in the human subject with this serum.

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ICE OR HEAT AS A LOCAL APPLICATION?

REMARKS ON ICE-MASSAGE IN PAINFUL CASES OF RHEUMATOID AND ALLIED FORMS OF ARTHRITIS AND ON THE LOCAL APPLICATION OF COLD IN SOME OTHER AFFECTIONS.

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FEW of our therapeutical inconsistencies are more surprising than our employment of the opposite extremes of temperature for similar conditions. For the relief of painful affections both fomentations and ice have been advocated and in the treatment of acute chest affections the ice-bag has entered into keen competition with the poultice and, it is claimed, with greater efficacy. The practical question may often be answered by the patient, but it would be well if from our side some estimate could be arrived at concerning the mode of action and the relative value of cold and of hot applications. This question is opportune in connexion with the recent methods of treatment by superheated air; and in painful forms of arthritis, such as those observed in the following cases, we have favourable material for study, since in them we obtain in addition to the patient's statement as to pain direct evidence from any changes brought about by treatment in the appearance and mobility of the joints. Ice-massage, or gently rubbing the exposed surface with a smooth block of ice for a few minutes, resembles Arnott's method (1851-64) by the direct application of ice rather than Esmarch's method (1860) by a continuous application of ice-bags. This device suggested itself to me whilst I was still unacquainted with the work of these observers as a possible mode of relief in a case of acutely painful rheumatoid arthritis of the hip in which the ordinary treatment by medicines by warmth and by the hot-air bath had been tried without success and in which finally the application of hot sand-bags seemed to aggravate rather than to relieve the affection.

CASE 1. *Painful rheumatoid arthritis of the left hip.*¹—The patient, a man, aged 33 years,² was pale and sallow but was fairly well nourished. His father was rheumatic and his mother suffered from painful Heberden's nodules and "rheumatic gout." The patient was previously healthy, although he had indulged in beer rather freely. He had been operated upon for glands in the neck in July, 1897. There was no history of rheumatic fever, but two or three weeks previously to the onset of the hip pain there had been some painful swelling of the wrists. He had not suffered from syphilis and there had been no gonorrhœa until September, 1898, when a small preputial sore and very slight discharge were observed for a day or two. The present symptoms had begun in December, 1897, with gradually increasing pain and impairment of movement in the left hip and had been much worse since August, 1898. Work had to be given up entirely some weeks before he was seen at the hospital and he was admitted with a diagnosis of sciatica on Nov. 19th, 1898, and since that time had remained in bed, not improving but deteriorating under treatment both as regards pain, fixation, and wasting of the limb. Prior to his

¹ This case was exhibited before the Chelsea Clinical Society on Feb. 21st, 1899.

² St. George's Hospital Medical Register, 1898, No. 1663.