This increased proportion of agglutinable strains, which was also found in the 1917 epidemic period, constitutes a second danger signal. (See article previously cited.)

7. Cases ceased to occur as soon as the dépôt was spaced out to some extent (barrack-rooms 30, huts 27, tents 7 men in each) and carrier rates declined, those of the barrack-rooms remaining high for two months.

Effects of Spacing Out in Other Units.

The results of "spacing out" beds to 2½ ft. in other units were equally remarkable. The table gives the results in four instances with men sleeping in barrack-rooms all severely overcrowded when the men were first examined.

Effects of "Spacing Out" on "Severely Overcrowded" Barrack-rooms.

Unit.	Date of First Swabbing.	Percentage Carrier Rate before Spacing Out.	Period Spaced Out Approximately.	Date of Second Swabbing.	Percentage Carrier Rate after Spacing Out.
No. 1	Sept. 29	22.0	8 weeks	Dec. 6	2.0
No. 2	Oct. 2	28.0	6 weeks	Nov. 23	7.0
One room of No. 2	Oct. 2	38.5	6 weeks	Nov. 23	4.5
No. 4	Oct. 26	28.0	5 weeks	Nov. 30	4.5

At the same time great attention was paid to the ventilation, which, particularly in the first instance, had been greatly interfered with by lighting restriction regulations. Other classes of accommodation, such as huts, Aylwin huts, and loose-boxes, yielded equally satisfactory results with spacing out, but details need not be given here.

The importance of reducing the carrier rate of a unit is not limited merely to the prevention of cerebro-spinal fever in the unit itself. A home unit with a high carrier rate involves the sending of highly infected drafts to transports and front line conditions where overcrowding is really inevitable. It also involves a certain, though small, number of cases occurring in civilians, usually the soldier's children, from infection by carriers returning on leave.

There are several practical points in the prevention of cerebro-spinal fever that I have not touched upon.

First, the well known fact that it is recruits in the first months of service who chiefly suffer from the incidence of the disease, would seem to indicate that this class of soldier should be protected by special "spacing out" (preferably to the full "peace standard") during the winter months, at any rate for his first three months of service.

Secondly, corners of rooms and huts are usually found to have carriers sleeping in them; this is no doubt due to

"dead end" ventilation. Partitions in huts (such as occur in a well known naval pattern) and barrack-rooms are therefore injurious, as they double the number of corners beside interfering with ventilation generally.

Thirdly, small subdivisions of a unit's sleeping accommodation, such as occur with tents or Aylwin huts or loose-boxes, limit infection, but at the same time focus it. A sample of 100 men in crowded Aylwin huts, for example, gave an average carrier rate of 15 per cent., whilst one hut in the sample had a 50 per cent. rate.

GENERAL CONCLUSIONS.

1. A high carrier rate usually denotes overcrowding and dangerously unhygienic conditions, even though no cases of the disease may have recently occurred.

2. Whilst sporadic cases may occur in a military as in any other community with any carrier rate, anything approaching an epidemic of cerebro-spinal fever is heralded by a warning rise of considerable height in the carrier rate.

3. Severe overcrowding will probably be accompanied by a carrier rate (serological) of at least 20 per cent. This percentage is indicated as the danger line in the War Office Memorandum on cerebro-spinal fever (March, 1917). A carrier rate of this height will usually imply that the mobilization standard of 40 sq. ft. per man has been infringed, and that beds in the unit examined are less than 1 ft. apart. It should be regarded as a signal for prompt and effective action to diminish overcrowding, and to improve ventilation.

4. The distance between beds is of paramount importance.

5. Carrier rates between 10 and 20 per cent. are unsatisfactory, and imply a certain amount of overcrowding; they must be watched with suspicion.

6. Carrier rates from 2 to 5 per cent. may be considered usual under the best conditions obtainable in barracks and hutments.

7. Under the same conditions of overcrowding ("non-contacts") carrier rates agree substantially with "contact" carrier rates.

8. Quite a moderate degree of "spacing out" of beds, combined with simple methods for improving ventilation, are highly efficient agents in reducing high carrier rates.

9. When a unit shows a high carrier rate, a distance of at least 2½ ft. between the beds should be enforced. The "peace" standard would, of course, be even more effective.

10. Recruits should be specially spaced out during their first three months of service.

REFERENCES.

1. R.A.M.C. Journal, January, 1918; Journal of Hygiene, July, 1918.
2. For details see the article previously quoted, R.A.M.C. Journal, January, 1918.

A CASE OF SUBACUTE INFECTIVE ENDOCARDITIS.

BY

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HAVING read with great interest the paper by Lieutenant H. J. Starling, R.A.M.C., on five cases of subacute bacterial endocarditis, reported in the issue of the BRITISH MEDICAL JOURNAL for August 17th, I am tempted to give an account of a case of endocarditis of great interest which has recently been under my observation in No. 2 Red Cross Hospital, France.

The patient, a man aged 40, died eight weeks after admission to hospital. He was sent with a diagnosis of "endocarditis." On admission he was pale, somewhat wasted, and in a typical "typhoid" condition, drowsy, and of slow mentality.

There was no history of previous rheumatic fever or any other disease. He stated that he was perfectly well till about five weeks previously, when he commenced to get severe headaches, malaise, and was very easily fatigued. There is no previous record of his temperature or cardiac condition.

On examination the apex beat was not displaced, nor was there any obvious enlargement of the heart. On auscultation a loud diastolic murmur was heard, conducted up the sternum to the aortic valve. There was also an apical systolic murmur. The pulse was 80, and of distinct water-hammer type. There was nothing abnormal in the chest or the abdomen. The spleen could not be felt. The patient was covered with an eruption of small petechial spots, which kept coming out in crops throughout the course of the disease.

A copy of the temperature chart is attached.

The urine contained a slight cloud of albumin, but otherwise presented nothing of special importance. Cultures made from the blood on several occasions were always sterile. A blood count was done many times, but there was never any leucocytosis, the number of white cells being between 7,000 and 8,000.

For treatment, courses of anti-streptococcic serum and also vaccines were tried, but with no effect whatever.

The course of the case was extremely slow, and the patient almost imperceptibly went downhill. The cardiac murmurs kept changing in quality throughout the disease, but the heart never became enlarged, and the apex beat all through remained in its normal position; the pulse was slow and regular throughout, and preserved its aortic quality.

The patient gradually became more and more toxæmic, and finally died eight weeks after admission.

Post-mortem Examination.

The heart was not enlarged, nor was there any degree of myocardial degeneration. A large cauliflower-like vegetation was found on one cusp of the aortic valve, almost completely closing the orifice of the valve. There was a similar vegetation on the adjoining cusp; the third cusp was free. The summit of the large vegetation was soft and friable, but the base was cartilaginous. The mitral valve had two or three similar but smaller vegetations on it. The right side of the heart was normal.

The spleen was dark, about twice its usual size, and showed two recent infarcts. There were also small infarcts in each kidney, but the rest of the examination showed nothing abnormal.

In a smear made from the aortic vegetation were seen enormous numbers of organisms resembling streptococci, rather large in size, and growing in chains of three to five.

Drawing of interior of left side of heart.

The remarkable features about this case were the insidious and slow progress, the absence of any definite cardiac symptoms, and the fact that the heart never became enlarged, in spite of the severity of the aortic lesion and the long duration of the case. This may be attributed to the fact that the large vegetation prevented any real leaking of this valve.

The patient was never really "cardiac"; there was no dyspnoea or oedema, and the pulse maintained a steady, regular, slow beat till the end. He was in a "typhoid" state throughout the disease, and died eventually of a slow toxæmia.

A CASE OF INTESTINAL OBSTRUCTION.

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THE case here reported was evidently an instance of intestinal obstruction due to the healing process of old tuberculous ulcers of the bowel, possibly secondary to a lung infection.

John S., aged 68 years, was admitted to the Ashton-under-Lyne Infirmary on April 16th, 1918, having been sent in by Dr. Macintyre on account of abdominal pain and distension accompanied by vomiting. At 16 years of age he had "slow fever," and at 25 years had "inflammation of the bowels." He stated that with the exception of these illnesses he had always been a healthy man, and up to three months ago had never had any digestive troubles. The bowels had always acted regularly without aperients.

Three months before admission he began to be troubled with "pain in the stomach," the pain being chiefly located in the epigastrium. Usually it came on suddenly within half an hour after taking food, and ceased suddenly. He vomited occasionally and this relieved the pain; the vomit was "very acid." His appetite had fallen off, and he had lost flesh considerably. The family history was unimportant.

The abdomen was greatly distended and the percussion note tympanitic all over. The liver dullness was normal. On palpation strong peristaltic waves could be set up, causing the intestines to stand out in well marked relief in transverse bands running obliquely downwards from left to right in the umbilical and hypogastric regions, the so-called "ladder phenomenon." There was also marked gurgling on palpation of the descending colon. No tumour was palpable. Though tenderness was general, it was most marked over the epigastrium. The heart and lungs were normal; temperature 98°, pulse 98, respirations 24.

Blood Count.

Erythrocytes ...	...	...	4,664,000
Haemoglobin value ...	...	...	65 per cent.
Colour index ...	...	...	0.7
Leucocytes ...	...	...	12,000
Eosinophils ...	...	...	0 per cent.
Polymorphs ...	...	...	74
Lymphocytes ...	...	...	18
Large mononuclears ...	...	...	2
Transitionals ...	...	...	6
Mast cells ...	...	...	0

Total non-protein nitrogen, 95 mg. per 100 c.cm.

The urine contained a trace of albumin and a few granular casts; indican was present in marked excess.

X-ray Report.

The x-ray examination showed the stomach to be of a partial hour-glass form. The bismuth meal passed freely into and through the duodenum and jejunum, but was obstructed in the ileum, from which it passed slowly into the caecum. The radiogram shows the small intestines filled with the bismuth meal, portions of the intestines being ballooned out with gas. The x-ray diagnosis was "obstruction in the lower part of the ileum."

The bowels acted naturally once or twice daily. The vomiting persisted and the pain increased, so that it became necessary to administer morphine. On the evening of April 15th, his general condition being satisfactory enough to warrant it, it was decided to open the abdomen in order to relieve the obstruction. The diagnosis before operation was obstruction in the ileum or at the caecum, probably due to a malignant growth.

Operation.

The abdomen was opened by a right paracentral incision through the rectus. Numerous loops of distended small intestine immediately protruded through the wound. A rapid examination only was permissible on account of the general condition. No definite tumour or band or other cause of obstruction was found. A Paul's tube was inserted high up in the ileum, drainage being free through the tube.

The day following the operation the patient's general condition improved and the vomiting ceased, but from then onwards he became gradually weaker and died on the third day.

Post-mortem Examination.

This was performed twenty-four hours later. Emaciation was not marked. There were very few adhesions at the site of the wound and little shutting off of the abdominal cavity. There was no definite tumour palpable, but at intervals along the small intestines at the attachment of the mesentery could be felt small hard masses. The largest mass, however, was situated in the descending colon just above the sigmoid, and this would probably have been palpable during life but for the general distension. On removal of the small intestine it was found that at a point 77 in. above the caecum there was extreme stenosis, the lumen of the bowel being contracted to a size sufficient only to admit a wooden match. The stenosis was due evidently to scar tissue formation consequent on a previous ulceration of the bowel, the scarring spreading pincer-wise, with much thickening at the attachment of the mesentery. The bowel above the obstruction was ballooned and its wall markedly hypertrophied. There were no stercoral ulcers—"distension ulcers of Kocher"—present. The peritoneal surface of the intestine in the neighbourhood of the stenotic areas showed numerous yellowish plaques. Between this main obstruction and the caecum there were three similar lesions of varying degrees of stenosis, and in one instance evidence of an old ulcer was distinctly visible on the interior of the bowel by an oval depressed scar with its main axis transverse. A similar condition also existed at a point in the descending colon, just above the sigmoid flexure, but here the thickening and scar formation was much more pronounced. The peritoneal surface of the bowel showed patches of pigmentation. It was not possible to remove the stomach in the usual way as its posterior wall was firmly adherent to the subjacent structures, and after removal by dissection it was found that there was an old healed ulcer which had given rise to much thickening and contraction of the posterior wall and a mild grade of hour-glass stomach. The mesenteric glands were enlarged and one or two showed calcification changes. The