Seventh Day.—A fast day.

Eighth Day.—30 grams of cooked fat bacon replace 30 grams of lean meat.

Ninth Day.—30 grams cooked fat bacon replace 15 grams of lean meat, 15 grams of boiled potato added.

Tenth Day.—30 grams of fat added.

Eleventh Day.—Breakfast: Weak coffee 300 c.cm., thin cream 15 c.cm., one egg, cooked fat bacon 30 grams, raw lettuce 200 grams. Lunch: Cooked lean meat 20 grams, fat 15 grams, cooked French beans or their equivalent 120 grams, boiled potato 60 grams, butter 15 grams. Tea: Weak tea 300 c.cm., cream 15 c.cm., boiled potato 30 grams, butter 15 grams. Dinner: Clear broth 200 c.cm., one egg, cooked cabbage 100 grams, cooked French beans 100 grams, butter 30 grams.

Twelfth Day.—Add fat 30 grams.

Thirteenth Day.—Add white bread 15 grams, subtract raw lettuce 120 grams. Add white bread 15 grams at tea, and subtract 30 grams of potato at lunch. Add butter 15 grams.

Fourteenth Day.—A fast day.

Fifteenth Day.—Breakfast: Coffee 300 c.cm., cream 20 c.cm., one egg, cooked fat bacon 30 grams, raw lettuce 100 grams, white bread 15 grams, butter 15 grams. Lunch: Cooked lean meat 60 grams, fat 30 grams, cooked French beans 120 grams, boiled potato 30 grams, butter 60 grams. Tea: Tea 300 grams, white bread 15 grams, one egg, butter 30 grams. Dinner: Clear broth 200 c.cm., one egg, cooked cabbage 120 grams, boiled potato 30 grams, butter 60 grams.

The diet on the fifteenth day represents carbohydrate 42 grams, protein 54 grams, fat 192 grams. Note that the carbohydrate is fairly well divided: Breakfast 12 grams, lunch 8 grams, tea 9 grams, dinner 13 grams. The energy provided by the diet is calories 2,112, sufficient for an average man who is not doing any manual work. If sugar remains absent the diet is altered by the addition of 3 grams of carbohydrate daily with a diminution of 6 grams of fat.

Every seventh day should be a fast day or a half-ration day; in the milder cases half-ration days suffice.

Under no conditions be influenced by the old-fashioned idea and add to the protein in the diet; if you do, quite frequently sugar will return, and you may think that it is due to the increase in carbohydrate and diminish it in error. This means that no so-called antidiabetic bread or biscuits may be given.

When we wish to reduce the weight of obese patients we give them an excess of protein; this applies to diabetics too, an excess of protein causes them to lose weight. Many years ago I found that by substituting cellulose, which is not absorbed, for protein patients stopped losing weight.

There is nothing gained by giving oatmeal instead of bread; as long as the carbohydrate is starch and not sugar its absorption is fairly slow; the type of starch makes no difference.

Various diets suggested during the last few months have the same underlying idea, although the authors of the diets frequently do not seem to recognise it—namely, the diminution in the quantity of protein.

The problem arises, What should be done when the sugar returns? The patient should fast until the sugar disappears; as a rule twenty-four hours suffice. Then one of two methods may be adopted: the progressive diet may be followed, but at double the previous rate, until the carbohydrate reaches two-thirds of that at which sugar returned, and then fat is added until the necessary amount of energy is being taken. Or the diet is halved, then the protein is rapidly increased up to the amount it was when sugar appeared and the fat increased at the same time. The carbohydrate is gradually increased until it reaches two-thirds of the amount that led to the return of sugar.

We must realize that protein and fat in excess will both lead to the reappearance of sugar in the urine.

The reappearance of sugar after some time without any alteration in the diet does not necessarily mean that a fresh period of alimentary rest need be prescribed, or even that a modification in the diet is essential. Some emotional disturbance may have led to glycosuria. Amongst my patients is a woman who has a return of glycosuria whenever the interval between letters from her son, who is fighting in France, is more than five days. Mental perturbation does not always lead to the same result. A severe case of diabetes, whose carbohydrate limit rose to 60 grams of carbohydrate, had bombs dropped in his garden on two occasions, he lost his brother, sister, and wife all within three months, but he did not have a return of sugar.

Exposure to cold, anxiety about catching a train, and many other minor things may lead to the return of sugar,

and should be inquired about before any alteration in diet is ordered.

In olden days much attention was paid to the weight of the patient, and the unwarrantable assumption was made that so long as the weight was maintained all was well with the patient. Try and make your patients believe the truth, that the weight is of comparative unimportance, that no diabetic has ever faded away. Make them exchange an interest in weight for one in the result of the test of the urine with Benedict's solution.

As a rule the gain in weight when the patient is upon the optimum diet is very slow, perhaps a few ounces a week. In the majority of cases a rapid increase means that oedema is developing. An exception came my way a short time ago in a man who had gained 17 lb. in six weeks. For two years he had been upon the old-fashioned treatment, and had become a skeleton, and a weak skeleton at that. The death of his medical adviser had led to his adopting the Allen treatment. He emphasized the rarity of the rapid increase in weight with completely beneficial results by making a somewhat unusual remark: "My doctor died; if he had not, I should."

In the past diabetics were not allowed to take much exercise, because it was thought that exercise would lead to loss of weight. It is found that a moderate amount of exercise allows the patient to metabolize more carbohydrate, and exercise is now ordered; the amount taken should be the same every day, otherwise it must be remembered that upon those days when less exercise is taken less carbohydrate must be included in the food.

The results obtained are better than those by any method adopted to date. You must remember that the treatment is not a cure, but that when carried out in the best possible manner a diet is found which allows the patient to live indefinitely, and to lead a useful life. Perhaps a cure will be discovered during the next few years which will allow us to permit the patients whom we have kept alive to return to a normal diet.

The treatment has not been in use long enough for us to have decided whether the carbohydrate tolerance gradually increases. In some cases I believe there are indications of this.

Young people who have developed the condition comparatively recently derive the most benefit from the treatment.

Of the seventy cases of severe disease which have come under my observation four have died from tuberculosis. These led me to exclude those who showed signs of that condition. I hope shortly to record what I believe to be the most satisfactory treatment when tuberculosis is present.

One patient died from pneumonia, two from gangrene which had started some time before they came under treatment. Four patients died within a day or two of admission to the hospital.

The majority are enjoying good health, and many are asking why they were not put upon the treatment a long time ago.

CARDIAC DISEASE IN SOLDIERS AND RECRUITS.

BY CAPTAIN W. SCARISBRICK, R.A.M.C.(T.).

THIS article has been written with the purpose of comparing the incidence of heart disease amongst soldiers and recruits, and embodies my personal notes. The great majority of the soldier cases had been on active service abroad, and included all degrees of severity of heart disease; the recruit cases also formed a fair representation of the different types of cardiac affection.

Notes of 218 cases of heart disease occurring amongst soldiers and 151 found amongst recruits have been collected; they have been classified into five broad and fairly distinct groups. These groups were selected because, whilst being sufficiently comprehensive, it was considered that classification in this manner should not prove too difficult, and the choice of treatment and the prognosis as to future utility would be moderately easy.

A few words of explanation as to the reason for assigning individual cases to a particular group may be useful. In the main, clinical and general signs, symptoms, and

previous medical and general history were the factors which decided the group in which any particular case was classified. Many of the soldier cases were, however, admitted to hospital, and kept under continuous observation. Subjective sensations received careful consideration, and it was found necessary in several instances to discount in a great measure symptoms complained of. In some cases important signs and symptoms were present indicating that such cases might be classified in more than one group—for example, where there was definite evidence of myocardial affection together with general neurosis, or where there was a positive history of severe strain accompanied by neurosis. Such cases were classified according to the predominant signs and symptoms found.

GROUP 1.—Organic Valvular Disease.

This group includes those cases, and those only, in which definite organic disease of one or more sets of cardiac valves could be diagnosed. A few cases of pericarditis, generally accompanied by some degree of organic valvular disease, and having the etiology of the latter, are included in this group. A definite history of one or more attacks of rheumatic fever was obtained in the majority of the cases, and in the remainder a history of scarlet fever, pneumonia, chorea, or influenza. In several cases giving a history of influenza the cardiac changes were so great as to suggest that rheumatic fever might in these instances have simulated an attack of influenza.

GROUP 2.—Myocardial Disease.

The chief signs and symptoms of cases in this group were as follows: The subject was pale, thin, and evidently weak. He complained of being very short-winded and of suffering from palpitation and fluttering sensations in the chest. In many instances sleep had been disturbed for a long time; the patient frequently woke up with a distressing feeling of breathlessness. In no case could any but the lightest form of work be performed. The pulse was soft, fairly rapid (90 to 110, or over), even after resting, and frequently irregular, without evidence of a predominant rhythm. The apex beat was nearly always found outside the nipple line, but usually in the fifth interspace, and the lateral limits of cardiac dullness were extended beyond the normal on both sides; this extension was increased after moderately severe exercise. The cardiac sounds were soft and lacking in muscular tone, and there was shortening (absolute) of the ventricular diastolic period. A blowing systolic bruit was present over the mitral area, and was usually transmitted towards the axilla. A soft systolic bruit was also frequently present over the aortic area. Premature systoles were heard in several cases. In a considerable number of cases a moderate degree of arterio-sclerosis was present.

A history of either pneumonia, scarlet fever, influenza, diphtheria, chronic rheumatism, or alcoholism was obtained. In one case the patient previously suffered from plumbism, but in no instance was a history of rheumatic fever given.

GROUP 3.—Strained Hearts.

The border-line between hearts having no organic disease but suffering from overstrain and certain types of cardiac neurosis is very indefinite. In some cases of cardiac strain there is accompanying neurosis, especially amongst soldiers returned from the front. Again, a heart weakened through myocarditis in the first place may be subjected to severe strain causing an exaggeration of the symptoms. In cases of strained heart the individual may be either well developed or have poor musculature. The subjective sensations in the majority of cases examined were only slight, but it was noted that, after certain forms of severe exertion which a patient was originally able to perform with impunity and ease, breathlessness and palpitation became marked. In a few, mainly young subjects, palpitation was present after only slight exertion. In most cases the pulse was regular, of good volume, and of normal rate. The apex beat was felt in the nipple line or just outside, and occasionally in the sixth interspace. The normal limits of cardiac dullness were only slightly extended, and there was no increase after exertion. On auscultation, the heart sounds were good as regards muscular tone, and a mitral systolic bruit, not so soft as in myocardial disease and yet not rough as in organic

valvular disease, accompanied the first sound. Occasionally, reduplication of the first sound at the apex was present and also premature systole. In several instances where premature systoles were present whilst resting, they were found after exercise to have disappeared. A systolic murmur was heard over the pulmonary area in some instances.

There was no history of any of the specific fevers (including rheumatic fever), tonsillitis, or chorea. Several had been athletes and all had been subject to severe muscular strain at some time or other. A number of the soldier cases had been gassed at the front.

GROUP 4.—Cardiac Neurosis.

In cases of neurosis, either general or cardiac, we are dealing with a factor which is most intangible and exceedingly difficult to estimate. In consequence of interference with the cardiac mechanism the heart fails to beat with perfect normality and various subjective sensations are present. Clinically two types were met with: (a) Those in which the cardiac sounds were weak, irregular, and rather rapid, a soft systolic bruit usually accompanying the first sound at the apex; the patient was poorly developed and showed general nervousness. (b) Those in which the cardiac sounds were exaggerated in muscular tone and the only other abnormal sign present was tachycardia. After exercise both types showed a marked increase in the rate of cardiac contraction but no dilatation or increased cardiac dullness. An endeavour was made to find some underlying cause for the cardiac neurosis. In most of them no history could be obtained of previous illness, although in some cases a family history of cardiac disease was given. In several cases, both soldiers and recruits, excessive tobacco-smoking was certainly the cause of the trouble, whilst in others slight enlargement of the thyroid, accompanied by signs of hyperthyroidism, accounted for the neurosis. In several instances drug taking was suspected, and in three cases admitted. Having eliminated all these, there still remains a certain proportion of the cases of cardiac neurosis without any definite assignable cause; these are referred to by some clinicians as "irritable hearts."

GROUP 5.—Alleged Cardiac Disability not Found.

Under the conditions existing at the present time the question of simulation of heart disease has become most important. Cases classified in this group comprised malingerers and one or two cases with cardio-respiratory murmurs. Many men who thought they had a weak heart, but who were found to be perfectly normal, are not included.

TABLE I.—Numbers of Soldiers and Recruits in the Different Groups.

	Soldiers.		Recruits.	
	No.	Percentage of Heart Cases.	No.	Percentage of Heart Cases.
Group 1. Organic valvular disease	88	40.4	59	39.1
Group 2. Myocardial disease ...	34	15.6	33	21.8
Group 3. Strained hearts ...	58	26.6	23	15.2
Group 4. Cardiac neurosis ...	32	14.7	27	17.9
Group 5. Alleged cardiac disability not found	6	2.7	9	6.0
	218	100.0	151	100.0

On comparing the two classes (soldiers and recruits) it is seen that the numbers found to have organic valvular disease of the heart out of the total "heart cases" are practically the same in each, although it does not follow that the incidence of organic valvular disease amongst soldiers is the same as amongst recruits.

According to a return supplied to the Statutory Committee appointed under the Naval and Military War Pensions Act, 1915, giving the number of disabled soldiers and sailors discharged from the beginning of the war up to May 31st, 1916, there were 2,503 cases of heart disease out of 33,919 total cases discharged—approximately 7.4 per cent. discharged for heart disease alone. The numbers

with organic valvular disease found amongst the soldiers under note, who were all put forward with a view to discharge from the army, represent nearly 7 per cent.—almost identical with the percentage found in the report mentioned above. If cases of myocardial disease and organic valvular disease be taken together the proportion reaches 10 per cent.

The corresponding percentages in the case of recruits are 3.0 and 4.8 respectively, indicating a lessened degree of heart disease amongst recruits. Considering the types of cardiac affection encountered in the two classes, it is seen that the proportion having organic valvular disease is the same in each.

In a similar manner, considering myocardial affection, it is found that 15.6 per cent. in soldiers and 21.8 per cent. in recruits come in this group.

In Group 3, comprising what have been termed "strained hearts," 26.6 per cent. were found in soldier cases and 15.2 per cent. in recruit cases.

From observation and examination it has been essayed as far as possible to subdivide these cases into those which were considered to be permanently strained and those only temporarily strained, the chief factors aiding in this connexion being the age of the patient, duration and kind of symptoms, and general development.

The proportions found were as follows:

TABLE II.—"Strained" Hearts.

	Soldiers.		Recruits.	
	No.	Percentage of Total Heart Cases.	No.	Percentage of Total Heart Cases.
Permanently strained hearts...	23	12.8	19	12.5
Temporarily strained hearts...	30	13.8	4	2.7

It is interesting to find that, whilst the proportion of permanently strained hearts would appear to be the same in both cases, temporarily strained hearts occur five times as frequently amongst soldier cases as amongst recruit cases. This result is what one might expect, considering that soldiers are more subject to sudden and very severe strain, enforcing rest with ensuing probable recovery, whilst in civilian life strain is not usually so great, but is spread over a longer period and has permanent effects.

In Group 4 (cardiac neurosis), 14.7 per cent. are found in the case of soldiers and 17.9 per cent. in the case of recruits. An endeavour was made to establish an underlying cause for the cardiac neurosis, with the following result:

TABLE III.—Causes of Cardiac Neurosis.

Causes of Cardiac Neurosis.	Soldiers.	Recruits.
(a) Enlarged thyroid	6	10
(b) Tobacco heart	4	4
(c) Drug taking	Nil	3
(d) Underlying cause doubtful ...	22	10
Total	32	27

Whilst 6 per cent. of the cases come under Group 5 in recruits, only 2.7 per cent. are found in the soldier cases.

CONCLUSIONS.

In conclusion, it appears to me that classification of the various kinds of cardiac affection into groups similar to those which have been described, and provided it is carried out carefully and systematically, should prove of material value in several ways—for example: (a) In helping to form a decision as to what kind of treatment, if any, should be adopted in a particular case; (b) in forming an opinion as to what category of military utility any particular man should be classified.

THE medical practitioners of Boston, Massachusetts, have, in view of the high cost of living, agreed to double their consultation fees and to raise the fee for night calls.

HYPOCHLOROUS SOLUTION ELECTRICALLY PRODUCED FROM HYPERTONIC SALINE AS A DISINFECTANT FOR SEPTIC WOUNDS,

AND FOR THE THROAT IN DIPHTHERIA, SCARLET
FEVER, ETC.

BY

J. M. BEATTIE, M.A., M.D.,

PROFESSOR OF BACTERIOLOGY, UNIVERSITY OF LIVERPOOL,
MAJOR R.A.M.C.T., 1ST WESTERN GENERAL HOSPITAL;

F. C. LEWIS, F.C.S.,

ASSISTANT LECTURER IN BACTERIOLOGICAL METHODS, UNIVERSITY
OF LIVERPOOL;

AND

G. W. GEE, L.R.C.P., D.P.H.,

ASSISTANT M.O.H. ST. HELENS.

In 1911–12 one of us (F. C. L.), following the work done by other observers, carried out a number of experiments on the purification of water by the passage of an electric current after the introduction into the water of varying proportions of salt. He used an oblong watertight box in which were a series of graphite plates arranged in parallel.

Later this plan was used in the earlier experiments in the electrical treatment of milk, and in a report presented to the Health Committee of the City of Liverpool by another of us (J. M. B.) on August 16th, 1914, a photograph of the electro-chemical cell used was given, and it was stated that though this electro-chemical sterilization gave a large measure of success with bacteria-containing fluids it was not suitable for milk. In view of the work recently recorded by Dakin, in the application of this well-established electrolytic process for the purposes of disinfection of hospital ships,¹ it is interesting to quote from the report above referred to that the apparatus used by Lewis

consisted of a series of circular intercommunicating graphite-walled, watertight cells, through which the contaminated fluid passed.

... The electricity was continuously applied by means of brass terminals screwed on to each graphite plate. This apparatus was used in a variety of ways; for example, all the plates were coupled in series or alternate plates were coupled in parallel with each other. The principle upon which the apparatus works is that when an electric current of suitable strength is passed through even a weak solution of salt, part of the salt is decomposed, as also is part of the water. As a result chemical reaction occurs and a body of high disinfecting value is produced. ... Experiments with this type of apparatus showed that bacteria of all kinds could be rapidly and effectively destroyed.

These experiments, confirming previous work by various observers, showed that a fluid of high bactericidal properties could be produced by the electrolysis of salt water, and it was evident that the main chemical agents produced were hypochlorous acid and sodium hypochlorite.

Later a simpler apparatus, on the same principle, was erected in our laboratory in Liverpool for the disinfection of culture tubes, slides, etc.

A description of this apparatus was published by F. C. Lewis,² and in this paper the importance of the electrodes being a neutral material such as carbon was emphasized, as was also the simplicity and cheapness of the apparatus.

Since this paper was published much work has been done on the disinfectant action of the hypochlorites³ by Lorrain Smith, Dakin, and others, and an apparatus, almost identical in structure with the apparatus used by Lewis in his early experimental work, has been recommended for use in hospital ships—ordinary sea-water being substituted for the solution of common salt used by him. The results obtained by the use of this electrolyzed sea-water have confirmed the results of the previous work on the subject and of the experience gained in this laboratory after two years' use of the simple apparatus which Lewis described.

In his preliminary work Lewis used varying proportions up to 20 per cent. solution of common salt. When it was decided to try this disinfectant for the cleansing of wounds, the salt content of the original solution was reduced to 3 per cent. in the hope of obtaining a disinfectant action of the hypochlorous acid and the lymph-flow stimulation of hypertonic saline so strongly advocated by Sir Almroth Wright. The results obtained with the wounds were very