with ordinary incandescent lights, claiming that the higher temperature obtained increased the skin reaction. As in natural heliotherapy, pigmentation is deemed a favourable sign. Seventy-five ampères are mentioned as a suitable strength of current. With the winter months upon us, and at a time, too, when tuberculosis of all kinds, unfortunately, is rife, it might be well for this form of treatment to be tried here more than is at present the case. Little more than a year ago, indeed, the number of therapeutic mercury-quartz lamps in this country could be counted on one's fingers.

THE PRELIMINARY EXAMINATION OF THE ENGLISH CONJOINT BOARD.

THE Royal Colleges of Physicians of London and Surgeons of England have revised the Regulations relating to the Preliminary Examination required for the Diplomas of the Colleges. Under the new conditions Latin is now an optional subject, and a larger range of optional subjects has been adopted. A candidate must pass in: (a) English; (b) Mathematics; (c) one of the following languages—Latin, French, Russian, German, Italian, or Spanish; (d) a second language selected from the foregoing list or one of the following subjects—Higher Mathematics, Experimental Mechanics, Chemistry, Physical Geography, Physics, Botany, Biology, Geology. The revised Regulations come into force at once.

THE WHITEHALL RECRUITING CASE.

AFTER a prolonged ordeal of preliminary inquiry and trial at the Old Bailey Dr. A. M. R. Sinclair, a medical practitioner, was recently acquitted of the serious charge of conspiring to defeat the provisions of the Medical Services Acts in connexion with the passing or rejecting of recruits for the Army. In summing up to the jury Mr. Justice Salter pointed out that Dr. Sinclair bore a high character and had a good practice, and that there was no motive to cause him to take part in any conspiracy. He had received none of the money supplied by the military authorities and none from the man Grantway, who was afterwards convicted. There was no evidence, his lordship said, that Dr. Sinclair had ever classified a recruit unfairly or even incorrectly. As Mr. Justice Salter, at the conclusion of the evidence for the prosecution, had directed the jury to acquit one of the other men charged, it may have been wondered by some why he did not take a similar course in the case of Dr. Sinclair. The legal reason for this was sound and the course worked to the advantage of Dr. Sinclair, as was no doubt intended. By allowing the case of Dr. Sinclair to go to the jury the opportunity was given to explain or contradict things given in evidence which might otherwise have left Dr. Sinclair under some suspicion. By accepting Dr. Sinclair's evidence in his own defence, as it is clear that his lordship did, a full establishment of innocence was secured. Dr. Sinclair not only denied the charge, but he defied the War Office to produce a single recruit wrongly classified by him, and declared his own independence in examining the men fairly, in spite of an apparently official suggestion that all should be passed and dealt with later by the army surgeons who might attend them. Dr. Sinclair is to be congratulated on complete exoneration from a degrading charge, and will have everyone's sympathy in a grave ordeal.

THE DIGESTIBILITY OF BREAD MADE FROM TWO PARTS OF WHEAT AND ONE PART OF OATS, BARLEY, MAIZE, OR RICE.

BY E. I. SPRIGGS, M.D., F.R.C.P.,

AND

A. B. WEIR, B.Sc.

(From the Duff House Laboratories).*

THE proposition that barley, oats, maize, and rice are good human foods really needs no scientific defence, for the history of mankind relates that nations have been fed upon each of these varieties of corn; also our modern knowledge of their composition and many experiments tell us that they can supply the place of wheat in a mixed diet.

The measures taken by the Government to make good the lack of wheat by the use of other kinds of corn have, nevertheless, called forth some complaints. The mass of our people did not realise before the war that the cereals given to animals are good human foods; and did not know that by eating oats, barley, or maize ourselves we can get from them several times the food value that is obtained by turning them into beef or pork. The enormous amount of food which can be thus made available is shown by the figures of Professor T. B. Wood,¹ who calculated that of nearly 17 million tons of various kinds of corn used in this country before the war only 5 millions went for human food. This is less than the average production of home-grown corn, which amounted to 6½ million tons.

In an article written for the Ministry of Food in the spring of this year² the use of a mixture of barley flour, oatmeal, rice flour, or maize flour with wheat flour for making bread at home was suggested by one of us, in the proportion of one part of the meal to two parts of wheat flour or war flour. This is a higher proportion than has hitherto been used by millers in diluting wheat flour. The experiments here described were made to determine the digestibility of the bread so prepared.

These observations have no direct bearing upon the relative advantages or disadvantages of grinding into flour a larger or smaller proportion of the wheat grain. A good deal of work has been done on that subject, and was summarised up to the year 1911 in the valuable report by Dr. J. M. Hamill³ to the Local Government Board. His conclusion was that "so far as relates to available or 'digestible' protein and energy the differences in nutritive value between different grades of flour made from the same wheat are usually insignificant when compared with the differences in nutritive value of flours made from wheats differing widely from one another in composition."

The Diet.

In our experiments we intended to have used a Government regulation wheat flour milled to yield about 80 per cent. of flour, but we were unable to obtain a certified sample of this, and therefore used a pre-war white flour for the basis of our breads, to which the other cereals were added.

In many researches upon the assimilability of different foods the food concerned has been given in such large quantities as to form the greater part or the whole of the diet. This method is capable of great accuracy, but the results obtained do not always apply when the same food is eaten with a mixture of others. Our object was to find out what changes, if any, took place in the proportion of food assimilated from an ordinary mixed diet when wheat was replaced by a moderate amount of other cereals. The use of a mixed diet brings in sources of error. We have, however, special facilities for giving the same food day by day, as our staff is accustomed to the preparation and accurate weighing in grammes of many different foods.

For the present purpose those foods were chosen which could be had in as constant a form as possible over a period of several weeks, and the subject of the experiment deter-

* A summary of the experiments here described in detail was contributed to the discussion on War Bread, held at the Medical Society of London on Monday, Oct. 8th. (See THE LANCET, Oct. 13th, 1917, p. 572.)

mined for himself beforehand what dishes he preferred and would find least tedious when repeated over the same period. Each day's food was prepared under the personal supervision of one person, who also made the bread. The quantities of flour used were weighed out in the presence of one of us.

The diet was as follows:—

Breakfast: 2 eggs; butter, 20 grammes; bacon, 40 g.; marmalade, 30 g.; cocoa, 250 c.c., from 14 g. of cocoa; milk, 100 c.c.

Lunch: Fillet of beef, 112 g.; potato, 56 g.; cabbage, 56 g.; rice pudding, 130 g.; tinned pears, 200 g.; butter, 10 g.; cream, 20 g.; black coffee.

Tea: Butter, 20 g.; jelly, 20 g.; milk, 100 c.c.; cocoa, 250 c.c., from 14 g. of cocoa.

Dinner: Clear soup, 250 c.c.; haddock, 174 g.; butter, 20 g.; cheese, 42 g.; coffee, 250 c.c.; milk, 100 c.c.

The eggs were chosen of the same size. The same cheese, marmalade, and jelly were used throughout. The ingredients of the rice pudding were weighed every time. The soup was made in exactly the same way each day.

Of these foods parts equal to those eaten were taken and, after mincing when necessary, the whole mixed and analysed. The analysis gave:—

	Grammes.			Calculated
	Protein.	Carbohydrate.	Fat.	calories.
Determined	98	117	169	2461
Estimated from tables	112	106	153	2302

The value of the diet as estimated from analyses of cooked foods is placed beneath for comparison. With the above diet a loaf of bread, weighing about a pound, was eaten daily. When the bread was added the diet gave just under 4000 calories per day, or about 65 calories per kilogramme for our subject. Of this total food value about 38 per cent. was in the form of bread.

The bread was prepared as follows. The day before an experiment began 26½ oz. of the white flour used was weighed out and mixed with 13½ oz. of the meal or flour to be tested, giving 2½ lb. of the mixed flour. This was then made into bread with yeast as described in Chapter IX. of "Food and How to Save It,"² the dough being divided into three equal loaves. As each experiment lasted three days the whole of the flour weighed out was consumed.

The white flour used was a pre-war white Canadian spring flour; the oatmeal was described as fine Scotch oatmeal; the barley flour and the maize were supplied by Messrs. Strachan, of Aberdeen, and are described as finest sifted barley flour and finest sifted maize flour respectively.

The war flour tested for comparison was obtained through the kindness of Mr. Oscar Andrews, of Belfast. It is a mixture of 80 per cent. wheat flour, 10 per cent. maize flour, and 10 per cent. barley flour; the wheat flour being 83 per cent. of the wheat, the maize flour 80 per cent. of the maize, and the barley flour 65 per cent. of the barley.

The white and war bread resembled each other in taste, both being crusty appetising loaves. The oatmeal and barley bread were also good, and the rice bread was very nice indeed. The maize bread was heavy but had an agreeable taste, and the heaviness did not made it unpalatable. It may be mentioned here that similar oatmeal bread has been eaten for some months by a number of people under the observation of one of us.

Details of the Experiment.

All the analyses were done by A. B. Weir. Each figure is the mean of at least two concordant results. The carbohydrate was determined gravimetrically after hydrolysis with dilute sulphuric acid in an autoclave at 115° C. for one hour. The other analytical methods were as described in a former paper.⁴

Analysis of the flours used gave the following figures:—

	Protein per cent.	Carbohydrate per cent.	Ether extract per cent.
White flour ...	13.0	80.5	2.4
Oatmeal ...	12.5	74.1	7.3
Barley flour ...	8.1	83.0	1.7
Maize meal ...	8.7	82.5	4.2
Rice flour ...	7.9	84.7	0.5
War flour ...	10.9	81.7	2.1

From these figures the amount and composition of the food taken as bread in each mixture of two-thirds wheat flour and one-third oatmeal, barley flour, maize meal, or rice was easily calculated. It was thought better to estimate the food value of the total flour used than to analyse the bread, thus escaping the difficulty of being sure of getting

proportionate parts of crust and crumb. A little of the food value of the flour is lost by fermentation to alcohol, how much we do not know; but it is only a small quantity and should be approximately the same in each experiment. The amount of yeast used was constant.

The subject of the experiment was a healthy young man of 9 st. 10 lb. (61.7 kilogrammes). He was working for 7 to 8 hours a day, and took exercise out of doors about two hours a day, walking, bicycling, and fishing. He had no indigestion, the appetite was good, and the bowels were open naturally every day.

The fæces corresponding to each kind of bread were separated by charcoal, which was taken at 6.45 A.M., at the beginning and end of each three-day period: it passed through the body in from 24 to 48 hours, a normal time. The total urine was collected and the nitrogen determined in order to ensure that no great variations in nitrogenous equilibrium took place.

In determining how much of the food material is lost in the fæces certain assumptions are made which, though not strictly true, do not invalidate the results of experiments done under conditions as far as possible identical. First, it is assumed that the ether extract of both foods and fæces is fat. Secondly, the nitrogen of the food and fæces is represented as equivalent to a corresponding amount of average protein. Thirdly, the nitrogen in the fæces is regarded as unassimilated nitrogen from the food, whereas a good part of it is contained in material cast off from the lining of the intestine, which may, however, be supposed to be fairly constant in health from day to day.

Results.

The following table gives the results obtained from each three days' experiment, expressed as grammes per day:—

Totals per Day (in Grammes).					
White bread—	Nitrogen.	Carbohydrate.	Fat.	Calories.	
Food taken	23.5	420.6	178.1	3987	
Fæces	2.1	1.5	10.8	164	
Food assimilated...	21.4	419.1	167.3	3823	
Oatmeal bread—					
Food taken	23.4	412.5	184.4	4011	
Fæces	2.9	3.7	10.8	184	
Food assimilated...	20.5	408.8	173.6	3827	
Barley-meal bread—					
Food taken	20.9	423.7	177.3	3961	
Fæces	3.8	2.9	9.4	196	
Food assimilated...	17.1	420.8	167.9	3765	
Maize bread—					
Food taken	21.0	423.1	180.4	3997	
Fæces	2.8	5.7	8.6	178	
Food assimilated...	18.2	417.4	171.8	3819	
Rice bread—					
Food taken	22.4	425.9	175.8	3965	
Fæces	2.3	2.7	7.7	142	
Food assimilated...	20.1	423.2	168.1	3823	
War bread—					
Food taken	22.2	424.2	177.0	3965	
Fæces	2.5	4.4	7.7	154	
Food assimilated...	19.7	419.8	169.3	3811	

The results can be compared more easily when expressed as the percentage of the total food taken which was assimilated in each experiment.

Percentage Assimilated.

	Nitrogen.	Carbohydrate.	Fat.	Calories.
White bread	91.0	99.6	93.9	95.9
Oatmeal bread	87.6	99.1	94.1	95.6
Barley bread	81.5	99.4	94.4	95.0
Maize bread	86.7	98.6	95.2	95.5
Rice bread	89.7	99.4	95.6	96.3
War bread	88.8	99.0	95.6	96.1

These figures show certain differences in the percentage absorption of nitrogen (or protein), which varied from 81 per cent. in the case of barley bread to round about 90 per cent. in the cases of white bread, rice bread, and war bread. The variations in the absorption of carbohydrate and fat are smaller; but it is remarkable that they appear to neutralise the effects of the nitrogen variations, for when the proportions of the total food values assimilated in each experiment are compared, as shown in the last column of the above table, they are seen to be almost identical, the lowest being 95 per cent. and the highest 96.3 per cent.

The percentage of food absorbed therefore in these six experiments, each with a different kind of bread, was almost

the same. The variation from the mean was less than 1 per cent.

As regards the effect on the bowels, part of the charcoal taken at 6.45 A.M. appeared the next morning in each case, and the rest was passed out the morning after, except in the rice experiment, when the final charcoal took two days to appear. In the case of oatmeal bread, rice bread, and war bread, the part containing the first charcoal was rather less solid. During all the rest of the experiment the fæces were formed and moderately hard.

Conclusions.

1. If properly prepared and baked, palatable breads can be made from a mixture of one-third of oatmeal, barley flour, maize flour, or rice flour, and two-thirds of wheat flour.

2. Experiment showed that each of these breads, when taken with a mixed diet, was, for the time of the observation and for this subject, as nourishing as the bread made from white wheaten flour.

References.—1. T. B. Wood: The National Food-Supply in Peace and War, p. 16, Camb Univ. Press, 1917 price 6d. 2. E. I. Spriggs: Food and How to Save It, chap. ix., H.M. Stationery Office, 1917, price 3d. 3. J. M. Hamill: On the Nutritive Value of Bread made from Different Varieties of Wheat Flour, p. 30. H.M. Stationery Office, 1911, price 3d. 4. E. I. Spriggs and A. J. Leigh: A Case of Pancreatic Insufficiency, p. 15, Quart. Journ. Med., vol. ix., 1915.

PARIS.

(FROM OUR OWN CORRESPONDENT.)

The Control of Typhoid Fever in the French Army.

RECENT statistics illustrate the progress made during the war in dealing with typhoid fever, and establish the excellent results obtained by the use of antityphoid vaccination. The figures for the first three months of the war, which are probably very incomplete, give 8191 cases with 3076 deaths—i.e., a mortality of 37.5 per cent.—the census of cases being certainly far short of the truth, taken as it was during a period of disorganisation. Later statistics doubtless give a truer idea of the facts. During the period Nov. 1st, 1914, to Oct. 31st, 1915, 87,618 cases with 8614 deaths were recorded; from Nov. 1st, 1915, to Oct. 31st, 1916, 17,656 cases with only 700 deaths. The frequency of typhoid was therefore five and a half times less during the second year of war than during the first, and the mortality more than twelve times less. These results are manifestly due to the general adoption of vaccination, which was not made compulsory in the army until March 28th, 1914, only some 125,000 men having been rendered immune by the fateful day of mobilisation, August 2nd. The first vaccine used immunised solely against Eberth's bacillus and it was not until later that vaccines were introduced against paratyphoid infection A and B, the significance of which was only slowly recognised. At the present moment the immunity due to vaccination is beginning to decline, and in view of the appearance of new cases among inoculated men the Service de Santé has recently decided to proceed to general revaccination. By the study of the statistics in periods of six months certain illuminating conclusions will be apparent. The first period, ending on April 30th, 1915, naturally shows the highest figures—viz., 58,014 cases with 7013 deaths, that is, a case-mortality of 15.3 per cent. From May 1st to Oct. 30th, 1915, vaccination having become more general and the provision of drinking water more abundant, the number of cases fell to 29,604 and of deaths to 1151, the case-mortality being thus 3.9 per cent. Compared with the first half-year, the frequency of typhoid has been reduced by more than one-half, while the mortality per 1000 men is seven times less. Vaccination against paratyphoid was then adopted and in the next following six months the frequency fell to 12,043 and the number of deaths to 302; from May 1st to Oct. 30th, 1916, the frequency was still further reduced, becoming almost negligible in May and June. Finally, from Nov. 1st, 1916, to Sept. 1st, 1917, the reduction continued; during these ten months there were only 2048 cases and 129 deaths. The number of vaccinations required to produce this result should be noted. The central laboratory of Professor Vincent at the Val-de-Grâce Military Hospital furnished 5,513,073 doses of vaccine. To gain an idea of the benefit resulting from this enormous labour it is calculated that if the frequency and mortality of typhoid had remained what they were at the end of 1914,

the number of cases of typhoid fever would have exceeded a million, and the number of resulting deaths 145,000, leaving out of account the probable aggravation of the disease caused by long-continued fighting and by three hot summers. Not less convincing is a comparison of the sanitary condition of the French Army before the war according to the latest official figures (1911): the cases of typhoid and paratyphoid occurring in the armies at the front are now seven times less numerous, and the deaths eight and a half times fewer than in time of peace.

Iodide of Starch as an Antiseptic.

M. Auguste Lumière, of Lyons, has recently made interesting experiments with a new antiseptic which is said to be as powerful and as harmless for purposes of irrigation as Dakin's fluid. Iodide of starch is prepared by mixing in a litre of boiling water 25 gm. of soluble starch and 50 c.c. of a 1:1000 solution of iodine in potassium iodide. This fluid, which contains in the litre 50 cgm. of iodine in a state of extreme division, is not irritating to the integuments, and has no effect on the linen or bedding. It is used in the same manner as Dakin's fluid, to which its antiseptic power is equal, while it is a much simpler preparation.

The Suppression of Iodism by Adrenalin.

Dr. Milian has succeeded in avoiding the unpleasant effects such as lacrymation, conjunctivitis, oedema of the lids, swelling of the face, and salivation, produced in many patients by the administration of potassium iodide. For this purpose he employs adrenalin, in a dose of 6 mgr. a day, in two doses. In several patients who showed complete iodide intolerance the symptoms disappeared in 24 hours and it was possible to continue treatment without provoking them afresh. He has used the same method to combat the reactions provoked by arsenobenzol.

Nov. 3rd.

CANADA.

(FROM OUR OWN CORRESPONDENT.)

Annual Meeting of Canadian Public Health Association.

The Prevalence of Venereal Diseases.—An outstanding discussion at the annual meeting of the Canadian Public Health Association, held in Ottawa on Sept. 27th and 28th, was opened by Captain Gordon Bates, C.A.M.C., Toronto, with a paper prepared in collaboration with Captain Morris McPhedran, C.A.M.C., and Captain Donald Fraser, C.A.M.C., upon the incidence of venereal disease. They contrasted the efficiency with which this menace is dealt with in the Army and the comparative indifference of civic authorities, pointing to the periodical inspection in the former, and the possibility of quarantine, a trustworthy weapon not to be obtained in civilian life. The paper outlined a recent investigation extending over four months, in which 417 cases were analysed, showing that 70 infected men were under 20 years of age, 144 between 20 and 25 years, some 260 being single men and 36 married. In 127 cases of infection there had been no payment of money to the woman, and only 44 women were classed as professional prostitutes. In the majority of the cases the women were working in poorly-paid occupations, such as domestics, sales-women, waitresses, and theatre ushers. In 295 cases the influence of alcohol was denied, and in 97 cases either the man or woman, or both, had indulged to excess. In 60 cases the infection took place in the girl's boarding-house, while in 119 cases infection took place out-of-doors. Emphasis was placed on the alarming prevalence of these diseases in almost every community in Canada; gonorrhoea was responsible for 10 per cent. of the blindness of the Dominion; many surgical operations were rendered necessary through it; many chronic diseases were caused by it. Syphilis was the cause of 35 per cent. of insanity in the country, while it was also one of the causes of mentally defective children. Diseases of the heart and blood-vessels were common sequelæ. Dr. Bates strongly urged that steps be taken immediately to facilitate early diagnosis and prompt treatment of all cases. Clinics, he said, should be established, not only in the large cities, but all over the country; treatment must not be quickly discontinued; and early marriages, which often resulted in innocent infection, must be safeguarded. Venereal diseases should be quarantined, and a law passed in Canada similar to that of Western Australia.