

TABLE II.
COMPOSITION OF ANIMAL FOODS.
SPECIMENS AS PURCHASED IN THE MARKETS.
(Including both Edible Portion and Refuse.)

KINDS OF FOOD-MATERIALS. (Italics indicate European analyses, the rest are American.)	Refuse: bones, skins, shells, etc.	EDIBLE PORTION.					
		Water.	Nutrients.	NUTRIENTS.			
				Protein (albuminoids).	Fats.	Carbo- hydrates, etc.	Mineral matters.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
MEATS — Fresh.							
Beef, side, well fattened,	19.7	43.8	36.5	14.4	21.3	—	0.8
Beef, round, rather lean,	10.0	60.0	30.0	20.7	8.1	—	1.2
Beef, sirloin, rather fat,	25.0	45.0	30.0	15.0	14.3	—	0.7
Beef, neck, "second cut,"	19.0	52.2	28.8	16.2	11.7	—	0.9
Beef, tongue,	15.3	54.0	30.7	14.5	15.4	—	0.8
Beef, heart,	6.0	53.4	40.6	14.8	24.8	—	1.0
Mutton, side, well fattened,	20.0	42.9	37.1	13.2	23.2	—	0.7
Mutton, leg,	18.4	50.4	31.2	15.0	15.5	—	0.7
Mutton, shoulder,	16.8	48.7	34.5	15.0	18.7	—	0.8
Mutton, loin (chops),	16.3	41.3	42.4	12.5	29.3	—	0.6
MEATS — Prepared.							
Dried beef,	6.5	55.5	38.0	27.4	4.2	—	6.4
Corned beef, rather lean,	6.2	54.5	39.3	12.5	24.9	—	1.9
Smoked ham,	12.5	36.3	51.2	14.6	34.2	—	2.4
Pork, bacon, salt,	5.0	9.5	85.5	2.8	76.5	—	6.2
FOWL.							
Chicken, rather lean,	41.6	42.2	16.2	14.2	1.2	—	0.8
Turkey, medium fatness,	35.4	42.8	21.8	15.4	5.6	—	0.8
DAIRY PRODUCTS, EGGS, ETC.							
<i>Cow's milk,</i>	—	87.4	12.6	3.4	3.7	4.8	0.7
<i>Cow's milk, skimmed,</i>	—	90.7	9.3	3.1	0.7	4.8	0.7
<i>Cow's milk, buttermilk,</i>	—	90.3	9.7	4.1	0.9	4.0	0.7
<i>Cow's milk, whey,</i>	—	93.2	6.8	0.9	0.2	5.0	0.7
<i>Cheese, whole milk,</i>	—	31.2	68.8	27.1	35.4	2.4	3.9
<i>Cheese, skimmed milk,</i>	—	41.3	58.7	38.3	6.8	9.0	4.6
<i>Butter,</i>	—	9.0	9.1	1.0	87.5	0.5	2.0
<i>Hen's eggs,</i>	13.7	63.1	23.2	11.6	10.2	0.6	0.8
FISH, ETC.							
Flounder, whole,	66.8	27.2	6.0	5.2	0.3	—	0.5
Haddock, dressed,	51.0	40.0	9.0	8.2	0.2	—	0.6
Bluefish, dressed,	48.6	40.3	11.1	9.8	0.6	—	0.7
Cod, dressed,	30.0	58.4	11.6	10.6	0.2	—	0.8
Whitefish, whole,	53.5	32.5	14.0	10.3	3.0	—	0.7
Shad, whole,	50.1	35.2	14.7	9.2	4.8	—	0.7
Mackerel, average, whole,	44.6	40.4	15.0	10.0	4.3	—	0.7
Salmon, whole,	35.3	40.6	24.1	14.6	8.8	—	1.0
Salt cod,	24.9	40.3	19.4	16.0	0.4	—	15.4 3.0
Smoked herring,	44.4	19.2	29.9	20.2	8.8	—	6.5 0.9
Salt mackerel,	33.3	28.1	32.5	14.7	15.1	—	7.1 1.7
Oysters, in shell,	82.3	15.4	2.3	1.1	0.2	0.6	0.4
Oysters, solids,	—	87.2	12.8	6.3	1.6	4.0	0.9
Scallops, edible portion,	—	80.3	19.7	14.7	0.2	3.4	1.4

TABLE III.
CONSTITUENTS OF VEGETABLE FOODS AND BEVERAGES.

KINDS OF FOODS AND BEVERAGES	Water.	NUTRIENTS.				
		Protein (albuminoids).	Fats.	Carbo- hydrates, etc.	Woody fibre.	Mineral matters.
FOODS.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Wheat-flour, average,*	11.6	11.1	1.1	75.4	0.2	0.6
Wheat-flour, maximum,*	13.5	13.5	2.0	78.5	1.2	1.5
Wheat-flour, minimum,*	8.3	8.6	0.6	68.3	0.1	0.3
Graham flour (wheat),	13.0	11.7	1.7	69.9	1.9	1.8
Cracked wheat,	10.4	11.9	1.7	74.0		1.4
Rye-flour,	13.1	6.7	0.8	78.3	0.4	0.7
Pearled barley,	11.8	8.4	0.7	77.8	0.3	1.0
Buckwheat flour,	13.5	6.5	1.3	77.3	0.3	1.1
Buckwheat "farina,"	11.2	3.3	0.3	84.7	0.1	0.4
Buckwheat "groats,"	10.6	4.8	0.6	83.1	0.3	0.6
Oatmeal,	7.7	15.1	7.1	67.2	0.9	2.0
Maize meal,	14.5	9.1	3.8	69.2	1.8	1.6
Hominy,	13.5	8.3	0.4	77.1	0.3	0.4
Rice,	12.4	7.4	0.4	79.2	0.2	0.4
Beans,	13.7	23.2	2.1	53.7	3.7	3.6
Peas,	15.0	22.9	1.8	52.4	5.4	2.5
Potatoes,	75.5	2.0	0.2	20.7	0.8	1.0
Sweet potatoes,	75.8	1.5	0.4	20.0	1.1	1.2
Turnips,	91.2	1.0	0.2	6.0	0.9	0.7
Carrots,	87.9	1.0	0.2	8.9	1.2	0.8
Cabbage,	90.0	1.9	0.2	4.9	1.8	1.2
Cauliflower,	90.4	2.5	0.4	5.0	0.9	0.8
Melons,	95.2	1.1	0.6	1.4	1.1	0.6
Pumpkins,	90.0	0.7	0.1	7.3	1.3	0.6
Apples,	84.8	0.4	0.0	12.8	1.5	0.5
Pears,	83.0	0.4	0.0	12.0	4.3	0.3
Starch,	15.1	1.2	0.0	83.3	0.0	0.4
Cane-sugar,	2.2	0.3	0.0	96.7	0.0	0.8
Wheat-bread,†	32.7	8.9	1.9		55.5	1.0
Graham-bread,	34.2	9.5	1.4		53.3	1.6
Rye bread,	30.0	8.4	0.5		59.7	1.4
Soda crackers,	8.0	10.3	9.4		70.5	1.8
"Boston" crackers,	8.3	10.7	9.9		68.7	2.4
"Ox-ter" crackers,	3.9	12.3	4.8		76.5	2.5
Oatmeal crackers,	4.9	10.4	13.7		69.6	1.4
Pilot (break) crackers,	7.9	12.4	4.4		74.2	1.1
Macaroni,	13.1	9.0	0.3		76.8	0.8
BEVERAGES.			Alco- hol.		Free acid.	
Lager-beer,	90.3	0.5	4.0	6.6	-	0.2
Porter and ale,	88.5	0.7	5.2	7.2	-	0.3
Rhenish wine, white,	86.3	-	10.5	2.6	0.4	0.2
Rhenish wine, red,	86.9	-	8.9	3.4	0.5	0.3
French wine, claret,	88.4	-	8.1	2.7	0.6	0.2

* Of analyses of American flours.

† From flour of about average composition.

The analyses of foods in Roman letters are American, those of foods and beverages in *Italics* are European.

The figures of Tables I. and II., with the exception of a few from European sources and indicated by italics, are selected from the results of the investigation referred to above, as conducted under the auspices of the Smithsonian Institution and the United States Fish Commission. The specimens of meats were purchased from a dealer in Middletown, Conn., and said by him to be "fair average samples of the better kinds of meats." A side of beef, freshly brought in winter from Chicago, and said to be a fair specimen of the best quality of "Chicago beef," was cut into about twenty-five pieces in the ordinary way. From each a sample fairly representing the whole cut was taken and analyzed. Thus the composition of each piece and of the whole side was learned. The composition of one of the leanest portions, the round, a moderately fat piece, sirloin, a very fat portion, flank, and of the whole side, together with a tongue, liver, and heart from another animal, are given in the table. The samples of a side of mutton and of parts of the same side were obtained and analyzed in like manner, as were those of the other meats and fowls. The specimens of cheese were from Washington market, New York, the analyses in the table representing averages of several samples. The butter was from a Vermont dairy. Some of the specimens of fish were purchased in Middletown, the most, however, were furnished gratuitously from Fulton market, New York, by Mr. E. G. Blackford, Fish Commissioner of the State of New York, who also contributed to the pecuniary expense of the investigation, as did likewise Mr. A. R. Crittenden of Middletown. A considerable number of the specimens whose analyses are given in this table, and in the tables beyond, were furnished by Mr. F. B. Thurber of New York, who also contributed a considerable sum toward defraying the cost of the research, as did also Hon. J. W. Alsop, M.D., of Middletown, Conn. It may be added that the figures in Tables I., II. and III. (aside from those from European sources) are selected from the results of nearly three hundred analyses of American food-materials, of which some two hundred are of fish and invertebrates.

Table III. gives analyses of vegetable food-materials and

beverages. The figures for wheat flour represent the results of forty-nine analyses of American flours, of which the majority were analyzed under the direction of Prof. Brewer, and the rest collated by him from other sources for the "Report of the United States Census, 1880." The largest and the smallest percentages of each ingredient found in the analyses are given opposite "maximum" and "minimum." The specimens of bread, crackers, etc., were purchased and analyzed at Middletown, Conn., and have probably about the usual composition of such materials.

I have said so much by way of introduction to the tables, that it may be hardly advisable to discuss their contents at much length. Nor will this be necessary, for the figures themselves tell their own stories, and very plainly. Only a glance is needed to show, for instance, that fish as found in the markets generally contain more refuse, bone, skin, etc., than meats, as is illustrated in Tables I. and II. With the larger proportions of both refuse and water, the proportions of nutrients, though variable, are usually much less than in meats. Thus a sample of flounder contained sixty-seven per cent of refuse, twenty-eight of water, and only five per cent of nutritive substance, while the salmon averaged twenty-three, the salt cod twenty-two, and the salt mackerel thirty-six per cent of nutrients. The nutrients in meats ranged from thirty per cent in beef to forty-six in mutton, and eighty-seven and a half in very fat pork (bacon). The canned fish compare very favorably with the meats. It is worth noting that the nutrients in fresh codfish, dressed, in oysters, edible portion, and in milk, all were nearly the same in amount — about twelve and a half per cent, though differing in kind and proportions.

Vegetable foods have generally less water and more nutrients than animal foods. Ordinary flour, meal, etc., contain from eighty-five to ninety per cent or more of nutritive material. But the nutritive values are not exactly proportional to the quantity of nutrients, because the vegetable foods contain but little protein and consist mostly of carbohydrates, starch, sugar, cellulose, etc., which are of inferior nutritive value, and because the protein they do contain is less digestible than that of animal foods. Pota-

toes contain a large amount of water, and extremely little protein or fats.

I wish to call attention to two more things concerning the composition of fish :

1st. The chief difference between the flesh of fish and ordinary meats is, that the fish generally contains less fat and more water. The fat contained in the meats is, in the fish, replaced to a considerable extent by water. On this account, the flesh of fish has, generally, a lower nutritive value, pound for pound, than ordinary meats. Fish, as we buy them, have the further disadvantage in comparison with meats, that they contain larger percentages of refuse bone, skin, entrails, etc., than meats.

2d. On the other hand, in the flesh of most fish, the nutritive material is nearly all protein. That is to say, fish supply the ingredient of food which is the most important, and as we shall see, the most expensive of all.

There is one difficulty with the tables, namely, that the figures for the analyses apply to either single specimens, or to averages of a number of specimens, and do not show the variations in the composition of the same food-material, which are often quite considerable. Two illustrations of this are given, the mackerel in Table IV., and the wheat flour in Table V. The figures for "maximum and minimum" in the latter show as above indicated, the largest and smallest percentages of each ingredient found in the forty-nine specimens of American wheat flour analyzed. Thus the percentages of water vary from eight and three-tenths to thirteen and five-tenths, the average being eleven and six-tenths per cent, while the protein varies from eight and six-tenths to thirteen and six-tenths, averaging eleven and one-tenth per cent.*

I hope to give elsewhere, at a proper time, more detailed tables of analyses illustrating these differences in detail. It must be confessed, however, that the number of analyses thus far made are very far from sufficient to show at all com-

* Since the above tables were prepared, the results of a large series of analyses of American grain and milling products have been reported by Mr. Clifford Richardson of the United States Agricultural Department. While these are a most important contribution to our knowledge of the subject, the main results do not differ widely from those here given.

pletely the variations in the composition of our food-materials. Nevertheless, the figures in the tables give a tolerably accurate idea of the composition of the food-materials named.

DIGESTIBILITY OF FOODS.

The question of the digestibility of foods is a very complex and difficult one, and I have noticed that the men who know most about it are generally the least ready to make definite and sweeping statements as to the digestibility of this or that kind of food-material. One great difficulty is the fact that what we ordinarily call the digestibility of a food includes several different things, the ease with which it is digested, the time required for digesting it, and the proportions of its several constituents that are digested.

The ease of digestion and the suitability of a food to the digestive organs of a given person are physiological rather than chemical questions, and, fortunately for myself, do not come within the scope of this lecture. The actual amounts digested are capable of more nearly accurate determination. Indeed, the percentage of the more important constituents of various foods actually digested by domesticated animals of different species, breeds, sexes, and ages, and under varying circumstances, has been a matter of active experimental investigation in the German agricultural experiment stations during the past twenty years. Briefly expressed, the method consists in weighing and analyzing both the food consumed and the solid excrement, which latter represents the amount of food undigested, the difference being the amount digested.

Such experiments upon human subjects, however, are rendered much more difficult by the necessity of avoiding complex mixtures of foods, in order that the digestibility of each particular food or food ingredient may be determined with certainty, and the fact that it is not easy to continue to eat the same kind of food long enough for a satisfactory experiment. No matter how palatable a simple food may be to a man at first, it has been found that it will almost certainly become repugnant to him after two or three days. In consequence, the digestive functions are disturbed, and the accuracy of the trial is impaired. In the experiments in

question, it was quite exceptional to find persons, in any walk of life, who could continue to eat large quantities of simple, plain food for tolerably long periods—a fact, by the way, which strikingly illustrates and emphasizes the importance of a varied diet in ordinary life.

Notwithstanding the difficulties referred to, a considerable number of experiments have been carried out, the majority in the physiological laboratory of the University of Munich, Germany. The results of a number of these experiments are concisely set forth in the following table:—

Percentages of Undigested Matters in Food-Materials.

KIND OF FOOD EATEN.	Percentage of the dry food lost as excrement.	PERCENTAGES OF THE	
		*Nitrogen of the foods which go to waste in the excrement.	Carbohydrates of the foods which go to waste in the excrement.
Lean beef,	5 or 6	2 or 3	—
Fish (haddock),	5 or 6	2 or 3	—
Eggs,	5½	2½	—
Milk,	8 to 10	7 to 12	—
Milk, with cheese,	6 to 11	3 to 5	—
Rice,	4	25	1
Potatoes,	9½	32	7½
Fat bacon, with some bread and beef,	8½ to 9½	12 to 14	2 to 6
White bread (wheat),	3¼ to 5½	19 to 26	1 to 1½
Coarse rye-bread (black bread),	15	32	11
Cabbage,	15	18½	15½
Yellow beets,	21	39	18

* Protein.

Thus the men upon whom the experiments were made digested all but 5 or 6 per cent of the whole dry matter (water-free substance) of the lean beef and the fish, and all but 2 per cent of their protein (nitrogen). Of the water-free substance of milk, a somewhat larger proportion passed through the body undigested. The vegetable foods were much less completely digested, the coarse rye bread and the beets, were, in this sense, the least digestible of all.

A. COSTS OF PROTEIN.

A subject that has received but little attention in this country, though it has become a vital one in Europe, and is becoming so with us, is the cost of the nutritive material of our foods. The relative cheapness or dearness of different foods must be judged by comparing, not the prices per pound, but the costs of the actual nutrients. In making such comparisons, the cost may be assumed to fall, not upon the inedible portions and the water, but solely upon the three classes of nutrients, the protein, fats, and carbohydrates. The relative physiological values of the nutrients in different foods depend upon (1) their digestibility and (2) their functions and the proportions in which they can replace each other in nutrition. An accurate physiological valuation is, in the present state of our knowledge, at least, impracticable. The pecuniary costs of the nutrients are, however, more nearly capable of approximation.

Various methods have been proposed for computing the relative pecuniary costs of the nutrients of foods, none of which, however, are entirely beyond criticism. The following, based upon German estimates of the relative costs of protein, fats, and carbohydrates, is perhaps as satisfactory as any. They are those of Prof. König.

From extended comparisons of the composition and market prices of the more important animal and vegetable food-materials, such as meats, fish, flour, etc., those which serve for nourishment and not as luxuries, and form the bulk of the food of the people, it has been estimated that a pound of protein costs, on the average, five times as much, and a pound of fats three times as much, as a pound of carbohydrates; that, in other words, these three classes of nutrients stand related to each other, in respect to cost, in the following proportions:—

<i>Assumed ratios of costs in staple foods.</i>	{	Protein, . . .	5
		Fats, . . .	3
		Carbohydrates, .	1

Perhaps a study of foods and prices in our markets might lead to a different scale of valuations, but this will serve our present purpose.

Suppose a pound of beef to cost 25 cents, and to contain 25 per cent of inedible matters, bone, etc., 45 per cent of water, and 30 per cent of nutritive substance, upon which latter — the bone and water being assumed to be without nutritive value — the whole cost comes. The 30 per cent or $\frac{30}{100}$ pounds of nutritive substance thus costs 25 cents, or at the rate of $83\frac{1}{3}$ cents per pound. If now we leave out of account the minute quantities of carbohydrates and the mineral matters, the whole cost will fall upon the protein and fats. Assuming these to cost in the ratio of 5 : 3 and the amounts in the meat to be : protein 15 per cent, and fats $14\frac{1}{4}$ per cent, an easy computation will show the protein to cost 106 cents and a pound of fats 64 cents.*

Of the different nutrients, protein is physiologically the most important, as it is pecuniarily the most expensive. For these reasons the cost of protein in different food-materials may be used as a means of comparing their relative cheapness or dearness, as is done in the following table. The figures represent the ordinary prices per pound and the corresponding costs of protein, in specimens of food-materials obtained in New York and Middletown, Conn., markets. Though the number of specimens is too small for reliable

* The methods of computing the cost of protein and the amounts obtained for 25 cents in different foods are as follows : —

1. *Cost of Protein* : — Suppose we wish to learn the costs of the nutrients in wheat flour, containing 11.1 per cent of protein, 1.1 per cent of fat, and 75.4 per cent of carbohydrates, and costing 4 cents a pound.

Let x represent the cost of a pound of carbohydrates in cents. Then, by the ratio of costs assumed above, a pound of fats would cost $3x$ cents and a pound of protein $5x$ cents. 100 pounds of the flour will cost 400 cents, and will contain 11.1 pounds of protein, 1.1 pounds of fats, and 75.4 pounds of carbohydrates. We shall have

	75.4 x cents =	cost of 75.4 pounds of	carbohydrates.
	3.3 x cents =	“ 1.1 “	fats.
	55.5 x cents =	“ 11.1 “	protein.
Total,	134.2 x cents =	“ 100 “	flour = 400 cents.

Whence $x = 3$ cents, cost of carbohydrates per pound.

$3x = 9$ cents, “ fats.
 $5x = 15$ cents, “ protein.

2. *Amounts of Nutrients obtained for 25 cents* : — At 4 cents per pound for the flour, 25 cents will pay for 6.25 pounds. By the percentage composition above given 6.25 pounds of flour will contain 0.69 pound of protein, 0.07 pound of fats, and 4.71 pounds of carbohydrates which are the amounts of nutrients obtained for 25 cents.

averages, the figures, taken together, doubtless give a tolerably fair idea of the relative costliness of the nutrients in the different classes of foods. It will of course be understood that the computations make allowance for the costs of the other nutrients, the fats and the carbohydrates, though for the sake of brevity the latter are omitted from the table.

COMPARATIVE COST OF PROTEIN IN FOOD-MATERIALS.

FOOD-MATERIALS.	At Prices per pound.	Cost of Protein per pound.	FOOD-MATERIALS.	At Prices per pound.	Cost of Protein per pound.
<i>Meats.</i>	Cents.	Cents.		Cents.	Cents.
Beef, sirloin,	25	106	Cod,	6	56
Mutton, leg,	22	91	Salt mackerel,	12.5	53
Beef, sirloin,	20	86	Salt cod,	7	43
Mutton, leg,	20	82	Mackerel,	5	40
Mutton, side,	20	73	Salt cod,	6	37
Beef, round,	18	70	Salt cod,	5	31
Mutton, leg,	16	66	Alewives,	3	27
Corned beef, lean,	15	66	Smoked herring,	6	24
Beef, round,	15	59			
Corned beef, lean,	15	55	<i>Dairy Products and Eggs.</i>		
Smoked ham,	18	51	Eggs, 40 cts. per dozen,	28	157
Smoked ham,	15	43	Eggs, 25 cts. per dozen,	18	101
Corned beef, lean,	10	36	Eggs, 15 cts. per dozen,	11	62
Beef, flank,*	15	36	Milk, 8 cts. per quart,	4	61
Beef, neck,	08	33	Milk, 7 cts. per quart,	3.5	53
Pork,* very fat, salted,	16	83	Cheese, whole milk,	18	37
Pork,* very fat, salted,	12	25	Cheese, whole milk,	13	27
			Cheese, skimmed milk,	8	18
<i>Fish.</i>			<i>Vegetable Foods.</i>		
Salmon,	100	511	Wheat bread,	8	38
Oysters, 50 cts. per quart,	25	336	Rice,	9	38
Oysters, 40 cts. per quart,	20	269	Potatoes,* \$1.00 per bushel,	1.7	30
Oysters, 30 cts. per quart,	15	202	Wheat bread,	6	29
Loibsters,	12	202	Potatoes,* 75 cts. per bushel,	1.38	22
Salmon,	30	153	Wheat bread,	4	19
Flounder,	8	149	Beans, 13 cts. per quart,	6.5	18
Shad,	12	99	Wheat flour,	4.5	17
Bluefish,	10	98	Wheat flour,	4	15
Lake trout,	15	92	Oatmeal,	5	15
Halibut,	15	85	Beans, 10 cts. per quart,	5	14
Haddock,	7	84	Potatoes,* 50 cts. per bushel,	0.85	14
Mackerel,	10	79	Wheat flour,	3.5	13
Cod,	8	75	Corn meal,	3	12
Canned salmon,	20	70			
Shad,	8	66			

* Containing little protein, the chief value being in other ingredients.

Thus the nutrients of vegetable foods are, in general, much less costly than in animal foods. The animal foods have, however, the advantage of containing a larger proportion of protein and fats, and the protein, at least, in more digestible forms.

Among the animal foods, those which rank as delicacies are the costliest. By the above calculations, the protein in the oysters costs from two to three dollars, and, in salmon,

risers to over five dollars per pound. In beef, mutton, and ham, it varies from 106 to 43 cents; in shad, bluefish, haddock, and halibut, the range is about the same; while in cod and mackerel, fresh and salted, it varies from 75 to as low as 31 cents per pound. Salt cod and salt mackerel are nearly always, fresh cod and mackerel often, and even the choicer fish, as bluefish and shad, when abundant, cheaper sources of protein than any but the inferior kinds of meat. Among meats, pork is the cheapest; but salt pork or bacon has the disadvantage of containing very little protein.

It is well worth the noting that oatmeal is one of the cheapest foods that we have; that is, it furnishes more nutritive material, in proportion to the cost, than almost any other. Corn meal is indeed cheaper, but the oatmeal has this great advantage over corn meal and wheat flour, that it has more protein. Of course, if we are to eat large quantities of lean meat—and most of us, I think, eat more than is best for our health, saying nothing of our purses, the extra protein in the oatmeal is of little consequence to us. But if one wishes to economize in his food, oatmeal, rightly cooked, affords an excellent material therefor.

One of the most interesting things brought out in the table is the cheapness of the staple vegetable food-materials such as potatoes, wheat flour, corn meal, oatmeal and beans.

B. AMOUNTS OF NUTRIENTS OBTAINED FOR 25 CENTS IN DIFFERENT FOOD-MATERIALS.

The above method of computing the relative expensiveness of different kinds of food-materials is, as I have said, open to the objection that it is based upon a certain assumed ratio of relative costs of protein, fats, and carbohydrates, which may or may not be right in any given case. A method free from these objections consists in computing how much of the several nutrients may be obtained for a given sum, for instance, 25 cents, in different food-materials. This is done in the following table:—

AMOUNT OF NUTRIENTS FURNISHED FOR 25 CTS. IN FOOD-MATERIALS AT ORDINARY PRICES.

FOOD-MATERIALS.	At Prices per pound.	Total Food- material.	25 CENTS WILL PAY FOR—					
			NUTRIENTS, — POUNDS.					
			Total.	Protein.	Fats.	Car- bohy- drates.		
<i>Meats.</i>			Cents.	Pounds.				
Beef, sirloin,	25	1.00	.29	.15	.14	—		
Mutton, leg,	22	1.14	.34	.17	.17	—		
Beef, sirloin,	20	1.25	.37	.19	.18	—		
Mutton, leg,	20	1.25	.38	.19	.19	—		
Beef, round,	18	1.39	.40	.29	.11	—		
Mutton, side,	20	1.25	.46	.17	.29	—		
Beef, round,	15	1.67	.49	.35	.14	—		
Beef, neck, whole,	8	3.13	.92	.48	.44	—		
Pork, salted, fat,	16	1.56	1.23	.04	1.19	—		
Pork, salted, fat,	12	2.08	1.65	.06	1.59	—		
<i>Fish.</i>								
Salmon,	100	.25	.06	.04	.02	—		
Oysters, 50 cts. per quart,	25	1.00	.12	.06	.02	.04		
Oysters, 35 cts. per quart,	17.5	1.42	.17	.09	.02	.06		
Salmon,	30	.83	.19	.12	.07	—		
Bluefish,	10	2.50	.27	.25	.02	—		
Shad,	12	2.08	.29	.19	.10	—		
Cod,	8	3.13	.34	.33	.01	—		
Mackerel,	10	2.50	.35	.25	.10	—		
Canned salmon,	20	1.25	.44	.25	.19	—		
Shad,	8	3.13	.44	.29	.15	—		
Cod,	6	4.17	.45	.44	.01	—		
Salt cod,	7	3.57	.58	.57	.01	—		
Salt mackerel,	12.5	2.00	.60	.20	.30	—		
Mackerel,	5	5.00	.71	.51	.20	—		
Salt cod,	5	5.00	.82	.80	.02	—		
Smoked herring,	6	4.17	1.21	.84	.37	—		
<i>Dairy Products and Eggs.</i>								
Butter,	30	.83	.73	—	.73	—		
Milk, 8 cts. per quart,	4	6.25	.74	.21	.23	.30		
Milk, 7 cts. per quart,	3.5	7.14	.84	.24	.26	.34		
Cheese, whole milk,	18	1.39	.90	.38	.49	.03		
Cheese, whole milk,	15	1.67	1.08	.45	.59	.04		
Cheese, skim milk,	8	3.13	1.69	1.20	.21	.28		
<i>Vegetable Foods.</i>								
Wheat bread,	8	3.13	2.08	.28	.06	1.74		
Wheat bread,	6	4.17	2.75	.37	.07	2.31		
Potatoes, \$1.00 per bu.,	1.7	3.24	3.04	.27	.03	2.74		
Beans, 10 cts. per quart,	5	5.00	3.96	1.16	.11	2.69		
Potatoes, 75 cts. per bu.,	1.25	18.00	4.13	.36	.04	3.73		
Wheat bread,	4	6.25	4.15	.56	.12	3.47		
Oatmeal,	5	5.00	4.48	.76	.36	3.36		
Wheat flour,	4.5	5.55	4.83	.62	.06	4.15		
Wheat flour,	4	6.25	5.44	.69	.04	4.71		
Potatoes, 50 cts. per bu.,	0.85	26.47	6.06	.53	.05	5.48		
Indian meal,	3	8.33	6.90	.70	.29	5.91		

Prof. Atwater, since the delivery of the above address, has submitted the following appendix for publication :—

In the above address, as given, were included some statements regarding daily rations, which constituted a practical application of the principles above set forth. At the request of Mr. Edward Atkinson, who desired the material to incorporate in an address to be given by himself as Chairman of

the Section of Economic Science and Statistics of the American Association for the Advancement of Science, I dictated the substance of the statements to a stenographer, being too much pressed for time to give to the preparation the care properly belonging to an article intended for publication, and appended a translation of a German dietary and some estimates for daily rations of food-materials of the composition of those given in the tables, the latter prepared by my assistant, Mr. Rockwood. The matter in this form is reproduced here.

STANDARDS FOR DAILY RATIONS.

In answer to the question "What should be the standard for a daily ration?" it may be said that the ordinarily accepted standards are estimated in terms of the three most important classes of the nutritive ingredients, or nutrients of food: (1) protein, or albuminoids; (2) fats; (3) carbohydrates.

Our best information upon this subject comes from Germany, accurate observations and experiments having been there made by Liebig, Moleschott, Pettenkofer, Voit and others. Payen, in France, and Frankland, Playfair, Lawes and Gilbert, in England, have also made most valuable contributions to the knowledge upon this subject.

I cannot forbear noting the fact, however, that very little attention appears to have been paid to the results of these experiments on this side of the Atlantic, or, for that matter, in England: even in some of the best text books in chemistry and physiology, those which are looked upon as most authoritative are too apt to pass the subject over most superficially, or almost to ignore it.

The standard rations assumed by Prof. Voit of Munich are more commonly accepted than any others, and are most frequently quoted and followed in estimating dietaries. The following are standards adopted by the Munich school of physiological chemists who follow Voit: —

Standards for Daily Rations.

	Protein.	Fats.	Carbohydrates.
	Grammes.	Grammes.	Grammes.
Children to 1½ years,	20-36	30-45	60-90
Children from 6 to 15 years, . .	70-80	37-50	250-400
Laboring man at moderate work, .	118	56	500
Laboring man at severe work, . .	145	100	450
Laboring woman,	92	44	400
Aged man,	100	68	350
Aged woman,	80	50	260

We are, of course, to understand that these figures represent only general averages. It is assumed that for an ordinary laboring man, doing an ordinary amount of work, the amounts of nutrients above given will suffice, and that with them he will hold his own; and that any considerable excess above these quantities will be superfluous. But, of course, no one expects any given man to adjust his diet exactly to this standard; he may need more, and may perhaps get on with less. He may eat more fats and less carbohydrates, or he may consume more protein, if he is willing to pay for it. If, however, he eats much less protein, and keeps up his muscular exertion, he will, in Prof. Voit's opinion, be apt, sooner or later, to suffer.

Protein is the costliest of the food ingredients, and hence the one which, from the pecuniary standpoint, most needs to be economized; and since, furthermore, its work of building up muscles, tendons, and the like, cannot be done by either of the other classes of nutrients; since, in other words, it is very expensive, one of the first questions in constructing an economical ration is, "What is the least amount of protein that will suffice?" This question cannot be answered exactly until we know more than we now do about the demands of different organisms under different conditions. The subject needs more thorough and experimental study. But we may find an approximate answer in results of observation and experiments already on record.

To resume briefly, in computing standard rations to supply sufficient food at the minimum cost, we have to learn —

1st. What is the minimum quantity of the most costly ingredient, viz., protein?

2d. What proportion of nutrients is contained in the food-materials we are to use?

But lack of complete data, as well as time for discussion, precludes further reference to the matter.

EXAMPLES OF GERMAN RATIONS.

Of late, a great deal of attention has been paid in Germany to this particular subject of the food of the people and the best ways to economize it. I noticed a statement in a scientific journal a few days ago that Bismarck had engaged Prof. König to prepare a series of schedules of rations for ordinary German laboring people, which I suppose actually means that one of the departments of the Prussian government has engaged Prof. König, who is one of the principal authorities in this line, to carry out this enterprise. Numerous attempts have already been made in this same direction. I have before me, for instance, a little brochure of about one hundred pages by Dr. Meinert, entitled "*Wie nährt man sich gut und billig?*" or "How can one feed himself well and economically?" That this is regarded as trustworthy is evinced by the fact that it was honored with a prize, offered by an association and awarded by a committee, consisting of Profs. Voit, Forster, and Beneke, three of the best known German authorities in this specialty. It tells in plain language about foods, their constituents, the proportions of the several nutrients in various foods, the relative cheapness and dearness of different food-materials as shown by the comparison of their composition with their price, and with the rest gives schedules of daily rations for families. There are three of these schedules, the first intended for a family with an annual income of 800 marks, or \$200, of which it is assumed that 60 per cent will be expended for food. The second is for a family with an income of 1,100 marks, or \$275, and the third for one of 1,500 marks, or \$375 per annum. The outlay for the food of each of the last two is to be about 53 per cent of the income. As the largest of the three incomes would be counted very small with us I have selected the schedule

corresponding to it rather than either of the others for the translation which I have caused to be made and include herewith.

DIETARY FOR A FAMILY FOR TWO WEEKS.

The following dietary is calculated for a family consisting of father, mother, and two children of ten and twelve years of age. The annual income for the support of the family is taken at 1,500 marks, or \$375, of which 53 per cent, 800 marks, or \$200 per year, which would make 220 pfennigs, or 55 cents per day, is to be spent for food. It is assumed that the mother and two children will require as much nutritive material in their food as two laboring men, so that the family of four persons will be equal in their demand to three laboring men. Dr. Meinert further assumes that to earn so large a sum as 1,500 marks per year, more than ordinarily hard work will be required, and hence, following Prof. Voit's figures for rations, he provides for a ration with nutrients a little in excess of the standard for a laboring man at moderate work. Prof. Voit's standards for an ordinary laboring man doing moderately hard work, and for the same man at severe work, are stated below, and with them Dr. Meinert's standard for the family in question.

Nutrients in Daily Ration.

NUTRIENTS.	PROF. VOIT'S STANDARDS.		Dr. Meinert's Standard for family with 1500 marks per year.
	For laboring man at moderate work.	For laboring man at severe work.	
Protein,	118 grams (0.25 lb.)	145 grams	120 grams.
Fats,	56 " (0.12 lb.)	100 "	70 "
Carbohydrates, . .	500 " (1.10 lb.)	450 "	500 "

As the family are counted equivalent to three "laboring men," the 220 pfennigs allowed for food per day must pay for three rations, which gives 73.3 pfennigs per ration. The problem, then, is to draw up a bill of fare for each day, which shall furnish a minimum of 120 grams or 0.27 lb. of protein, 70 grams or 0.15 lb. of fats, and 500 grams or 1.10

lbs. of carbohydrates, for 73.3 pfennigs or 18 $\frac{3}{4}$ cents per day, in food-materials such as a German laborer may properly use, and at such prices as he must pay for them.

In accordance with German usage provision is to be made for breakfast, dinner at midday, lunch (*Vesperbrot*) in the afternoon, and supper (*Abendessen*). The following is Dr. Meinert's outline of the bill of fare for two weeks:—

Bill of Fare for Fourteen Days.

DAY.	BREAKFAST.	DINNER.	LUNCH.	SUPPER.
1st,	Coffee, milk, rolls, black bread, butter.	Fresh haddock with mustard sauce and potatoes.	Coffee and milk. Bread and butter.	Meat and vegetable soup.
2d,	" "	Beef stew with kohlrabi and potatoes.	" "	Cheese and beer.
3d,	" "	Sausage with millet, milk and beer.	" "	Onion soup.
4th,	" "	Mutton and beans.	" "	Potato soup.
5th,	" "	" <i>Fleischgraupen</i> " with bacon and beer.	" "	Pea soup.
6th,	" "	" <i>Klöße</i> " (dumplings) with fruit.	" "	Herring and beer.
7th,	" "	Dried codfish with sauerkraut, peas and beer.	" "	Buttermilk soup.
8th,	" "	Hashed meats with potato soup.	" "	Meat and vegetable soup.
9th,	" "	Sausage (<i>Buttoursst</i>) with lentils and beer.	" "	Potatoes and curd.
10th,	" "	Liver with potato salad.	" "	Cheese and beer.
11th,	" "	Beefsteak with cabbage and potatoes.	" "	Bread and milk soup.
12th,	" "	Herring, potatoes and beer.	" "	Meat and vegetable soup.
13th,	" "	Pork with cabbage and potatoes.	" "	Cheese and beer.
14th,	" "	Liver with spinach, potatoes and beer.	" "	Oatmeal in buttermilk.

The details of the daily bills of fare are given by Dr. Meinert in the forms translated beyond. The quantities are given in the metric weights and measures current in Germany. It will be remembered that the kilogram consists of 1,000 grams and equals about 2.2 lbs.; that the gram is nearly 15.5 grains, and, roughly speaking, 450 grams make a pound and 28 grams an ounce. The liter is 1,000 cubic centimeters, a little over a quart; a liter of water weighs 1 kilogram. The mark consists of 100 pfennigs, and is worth about twenty-five cents, so that the pfennig is one-quarter of a cent. Translating these into our own weights and measures would, I think, rather detract from than add to their clearness and value. In their present form they are

simple, but would by recalculation become more complex. In the summary at the end, the quantities and prices are given in American weights and money.

In translating I will for convenience speak of the first and second breakfast together as breakfast. The midday and evening meals we will call dinner and supper, and will follow Dr. Meinert's example in including the afternoon lunch with breakfast.

In this dietary Dr. Meinert gives first a general schedule for breakfast and lunch, which (or its equivalent) is to serve for each of the fourteen days. The schedule for dinner and supper for each several day is given by itself. It is assumed that the material left over at one time will serve for another, and that thus the evening meals may be filled out from what is left at breakfast or dinner.

Breakfast and Lunch.

AMOUNT OF FOOD AND PRICE.	Amount in grams.	Price per kilo. or liter in pfennigs.	Price of the amount indicated in pfennigs.	AMOUNT OF —		
				Protein. Grams.	Fats. Grams.	Carbohydrates. Grams.
4 wheat rolls,	290	-	12	15	2	148
Rye bread,	1,500	24	36	90	9	750
Coffee and coffee substitutes,	60	-	9	5	1	28
1½ liters skimmed milk,	1,250	8	10	38	6	50
Butter,	100	240	24	-	98	-
Salt,	75	20	1.5	-	-	-
2 liters beer,	2,000	12	24	10	-	160
		-	116.5	158	116	1,136
Per head and day,			38.8	53	39	379
There remains for dinner and supper,			34.5	67	31	121
Total per head per day,			73.3	120	70	500

It will be observed that the cost of each material is stated, with the amounts of nutrients it contains. By "per head" is understood for one laboring man. It will be remembered that the mother and two children were assumed to require as much as two laboring men.

Here follow details of dinner and supper, and summary for each of the 14 days.

lbs. of carbohydrates, for 73.3 pfennigs or $18\frac{3}{4}$ cents per day, in food-materials such as a German laborer may properly use, and at such prices as he must pay for them.

In accordance with German usage provision is to be made for breakfast, dinner at midday, lunch (*Vesperbrot*) in the afternoon, and supper (*Abendessen*). The following is Dr. Meinert's outline of the bill of fare for two weeks:—

Bill of Fare for Fourteen Days.

DAY.	BREAKFAST.	DINNER.	LUNCH.	SUPPER.
1st,	Coffee, milk, rolls, black bread, butter.	Fresh haddock with mustard sauce and potatoes.	Coffee and milk. Bread and butter.	Meat and vegetable soup.
2d,	" "	Beef stew with kohlrabi and potatoes.	" "	Cheese and beer.
3d,	" "	Sausage with millet, milk and beer.	" "	Onion soup.
4th,	" "	Mutton and beans.	" "	Potato soup.
5th,	" "	" <i>Fleischgraupen</i> " with bacon and beer.	" "	Pea soup.
6th,	" "	" <i>Klöße</i> " (dumplings) with fruit.	" "	Herring and beer.
7th,	" "	Dried cod fish with sauerkraut, peas and beer.	" "	Buttermilk soup.
8th,	" "	Hashed meats with potato soup.	" "	Meat and vegetable soup.
9th,	" "	Sausage (<i>Blutcurst</i>) with lentils and beer.	" "	Potatoes and curd.
10th,	" "	Liver with potato salad.	" "	Cheese and beer.
11th,	" "	Beefsteak with cabbage and potatoes.	" "	Bread and milk soup.
12th,	" "	Herring, potatoes and beer.	" "	Meat and vegetable soup.
13th,	" "	Pork with cabbage and potatoes.	" "	Cheese and beer.
14th,	" "	Liver with spinach, potatoes and beer.	" "	Oatmeal in buttermilk.

The details of the daily bills of fare are given by Dr. Meinert in the forms translated beyond. The quantities are given in the metric weights and measures current in Germany. It will be remembered that the kilogram consists of 1,000 grams and equals about 2.2 lbs.; that the gram is nearly 15.5 grains, and, roughly speaking, 450 grams make a pound and 28 grams an ounce. The liter is 1,000 cubic centimeters, a little over a quart; a liter of water weighs 1 kilogram. The mark consists of 100 pfennigs, and is worth about twenty-five cents, so that the pfennig is one-quarter of a cent. Translating these into our own weights and measures would, I think, rather detract from than add to their clearness and value. In their present form they are

simple, but would by recalculation become more complex. In the summary at the end, the quantities and prices are given in American weights and money.

In translating I will for convenience speak of the first and second breakfast together as breakfast. The midday and evening meals we will call dinner and supper, and will follow Dr. Meinert's example in including the afternoon lunch with breakfast.

In this dietary Dr. Meinert gives first a general schedule for breakfast and lunch, which (or its equivalent) is to serve for each of the fourteen days. The schedule for dinner and supper for each several day is given by itself. It is assumed that the material left over at one time will serve for another, and that thus the evening meals may be filled out from what is left at breakfast or dinner.

Breakfast and Lunch.

AMOUNT OF FOOD AND PRICE.	Amount in grams.	Price per kilo or liter in pfenigs.	Price of the amount indicated in pfenigs.	AMOUNT OF —		
				Protein. Grams.	Fats Grams.	Carbohydrates. Grams.
4 wheat rolls,	290	-	12	15	2	148
Rye bread,	1,500	24	36	90	9	750
Coffee and coffee substitutes,	60	-	9	5	1	28
1½ liters skimmed milk,	1,250	8	10	38	6	50
Butter,	100	240	24	-	98	-
Salt,	75	20	1.5	-	-	-
2 liters beer,	2,000	12	24	10	-	160
			116.5	158	116	1,136
Per head and day,		-	38.8	53	39	379
There remains for dinner and supper,		-	34.5	67	31	121
Total per head per day,			73.3	120	70	500

It will be observed that the cost of each material is stated, with the amounts of nutrients it contains. By "per head" is understood for one laboring man. It will be remembered that the mother and two children were assumed to require as much as two laboring men.

Here follow details of dinner and supper, and summary for each of the 14 days.

Bill of Fare for Dinner and Supper for Fourteen Days.

AMOUNT OF FOOD.	Amount in grams.	Price per kilo or liter in pennings.	Price of the amount indicated in pennings.	AMOUNT OF —		
				Protein. Grams.	Fats. Grams.	Carbohydrates. Grams.
FIRST DAY.						
Fresh haddock,	500	80	40	60	5	8
Mustard,	125	80	10	33	42	31
Flour,	50	40	2	6	—	35
Fat (lard, butter),	60	130	8	—	57	—
Potatoes,	2,500	7	17.5	50	3	500
"Fleischgemüse,"*	125	200	25	40	22	44
		—	102.5	189	129	618
Per head,	—	—	34.2	63	43	206
For breakfast, lunch, etc.,	—	—	38.8	53	39	379
Total per head and day,	—	—	73.0	116	82	585
SECOND DAY.						
Beef,	500	120	60	80	40	—
Fat (lard, butter, etc.),	100	130	13	—	95	—
Kohlrabi,	1,000	15	15	27	2	86
Potatoes,	1,500	7	10.5	30	3	300
Skim-milk cheese,	300	50	15	120	21	—
	—	—	113.5	257	161	386
Per head,	—	—	37.8	86	54	129
For breakfast, lunch, etc.,	—	—	38.8	53	39	379
Total per head and day,	—	—	76.6	130	93	508
THIRD DAY.						
Millet,	500	40	20	56	17	290
Skimmed milk,	1,500	8	12	45	7	60
Sausage,	300	180	54	69	33	21
Onions,	150	10	1.5	4	—	12
Fat,	50	130	6.5	—	47	—
Flour,	150	40	6.0	17	2	105
	—	—	100.0	191	106	488
Per head,	—	—	33.3	64	35	163
For breakfast, lunch, etc.,	—	—	38.8	53	39	379
Total per head and day,	—	—	72.1	117	74	542
FOURTH DAY.						
Mutton,	500	120	60	75	50	—
Beans,	500	40	20	130	10	250
Fat,	100	130	13	—	95	—
Potatoes,	2,000	7	14	40	2	400
	—	—	107	245	157	650
Per head,	—	—	35.6	82	52	216
For breakfast, lunch, etc.,	—	—	38.8	53	39	379
Total per head and day,	—	—	74.4	135	91	595

* "Fleischgemüse," soup made from a mixture of preserved South American meat and vegetables especially recommended by Dr. Meinert.

Bill of Fare — Continued.

AMOUNT OF FOOD.	Amount in grams.	Price per kilo or liter in pennings.	Price of the amount indicated in pennings.	AMOUNT OF —		
				Protein, Grams.	Fats, Grams.	Carbohydrates, Grams.
FIFTH DAY.						
"Fleischgraupen,"	450	150	68	100	10	300
Bacon,	125	160	20	3	98	—
Pease,	300	50	15	67	6	150
Lard,	40	170	7	—	37	—
Spices,	—	—	2	—	—	—
	—	—	112	170	151	450
Per head,	—	—	37.3	57	50	150
For breakfast, lunch, etc., . .	—	—	38.8	53	39	379
Total per head and day, . . .	—	—	76.1	110	89	529
SIXTH DAY.						
Wheat flour,	600	45	27	66	6	438
Potatoes,	1,500	7	10.5	30	1.5	300
Wheat rolls,	72	—	3	4	—	35
Fat,	100	136	13	—	95	—
Fruit,	250	80	20	8	2.5	113
Sugar,	30	100	3	—	—	27
Herrings,	260	7	21	52	32	5
	—	—	97.5	160	137.0	918
Per head,	—	—	32.5	53	46	306
For breakfast, lunch, etc., . .	—	—	38.8	53	39	379
Total per head and day, . . .	—	—	71.3	106	85	685
SEVENTH DAY.						
Dried codfish,	250	140	35	108	3	—
Sauerkraut,	1,000	18	18	10	2	46
Pease,	300	50	15	67	3	150
Fat,	100	130	13	—	95	—
Buttermilk, 2 liters,	2,000	6	12	51	15	15
	—	—	93	326	118	211
Per head,	—	—	31	109	39	70
For breakfast, lunch, etc., . .	—	—	38.8	53	39	379
Total per head and day, . . .	—	—	69.8	162	78	449
EIGHTH DAY.						
Beef,	200	120	24	32	16	—
Pork,	100	130	13	14	10	—
Mutton,	125	120	15	20	8	—
Fat,	60	130	8	—	56	—
Spices and vegetables,	40	3	—	—	—	—
Potatoes,	3,000	7	21	60	3	600
"Fleischgemüse,"	125	200	25	40	22	46
	—	—	106	166	115	646
Per head,	—	—	35.3	55	38	215
For breakfast, lunch, etc., . .	—	—	38.5	53	39	379
Total per head and day, . . .	—	—	74.1	108	77	594
NINTH DAY.						
Sausage,	300	160	48	35	34	78
Lentils,	500	60	25	125	10	250
Vinegar,	—	—	3	—	—	—
	—	—	—	—	—	—

FIFTH DAY.
Dinner. — "Fleisch-
 graupen" with
 bacon and beer.
Supper. — Pea
 soup.

SIXTH DAY.
Dinner. — Dump-
 lings with fruit.
Supper. — Herring
 and beer.

SEVENTH DAY.
Dinner. — Dried
 cod fish, with
 sauerkraut, pease
 and beer.
Supper. — Butter-
 milk soup.

EIGHTH DAY.
Dinner. — Hashed
 meats with po-
 tato soup.
Supper. — Meat and
 vegetable soup.

NINTH DAY.
Dinner. — Sausage
 and lentils.

Bill of Fare — Continued.

AMOUNT OF FOOD.	Amount in grams.	Price per kilo or liter or pfennigs.	Price of the amount indicated in pfennigs.	AMOUNT OF —		
				Protein. Grams.	Fats. Grams.	Carbohydrates. Grams.
NINTH DAY.						
Curd,	250	40	10	43	8	7
Potatoes,	2,500	7	17.5	50	3	500
	—	—	103.5	253	55	835
Per head,	—	—	34.5	84	18	278
For breakfast, lunch, etc., . .	—	—	38.8	53	39	379
Total per head and day, . .	—	—	73.3	137	57	657
TENTH DAY.						
Liver and lungs,	500	80	40	97	27	10
Lard,	40	1.70	6.8	—	36	—
Wheat rolls,	156	—	6	6	1.5	78
Flour,	40	40	1.6	4	0.5	23
Onions,	50	10	.5	1	—	4
Pepper and vegetables,	60	—	1.6	—	—	—
Potatoes,	2,500	7	17.5	50	2.5	500
Vinegar and oil,	—	—	6	—	—	—
Cheese,	300	50	15	120	21	—
	—	—	94.0	278	88.5	620
Per head,	—	—	31.3	93	29	207
For breakfast, lunch, etc., . .	—	—	34.8	53	39	379
Total per head and day, . .	—	—	70.1	146	68	586
ELEVENTH DAY.						
Beefsteak,	400	160	64	88	20	—
Lard,	60	170	10	—	57	—
Red cabbage,	1,000	15	15	18	2	70
Potatoes,	1,500	7	10.5	30	1	300
Bread,	300	24	7	18	3	150
Skimmed milk,	1,500	8	12	45	7	60
	—	—	118.5	199	90	580
Per head,	—	—	39.5	63	30	193
For breakfast, lunch, etc., . .	—	—	38.8	53	39	379
Total per head and day, . .	—	—	78.3	116	69	572
TWELFTH DAY.						
Three herrings,	260	*7	21	52	32	5
Potatoes,	3,000	7	21	60	3	600
Skimmed milk,	1,000	8	8	30	4	40
Flour,	50	40	2	5	0.5	35
Onions,	50	10	0.5	1	0.5	3
Lard,	50	170	8.5	—	47	—
Spices,	—	—	1.5	—	—	—
"Fleischgemüse,"	125	200	25	40	22	46
	—	—	87.5	188	109.0	729
Per head,	—	—	29.2	63	36	243
For breakfast, lunch, etc., . .	—	—	38.8	53	39	379
Total per head and day, . .	—	—	68.0	116	75	622
THIRTEENTH DAY.						
Pork,	500	130	65	67	60	—
Cabbage,	1,000	10	10	20	1	66
Potatoes,	2,000	7	14	40	2	403
Lard,	50	170	8.5	—	47	—
	—	—	—	—	—	—

* At 7 pfennigs each.

Bill of Fare — Concluded.

AMOUNT OF FOOD.	Amount in grams.	Price per kilo or liter in pence.	Price of the amount indicated in pence.	AMOUNT OF —			
				Protein. Grams.	Fats. Grams.	Car- bohydrates. Grams.	
Cheese,	300	50	15	120	21	—	THIRTEENTH DAY. { <i>Supper.</i> — Cheese and beer.
	—	—	112.5	247	131	466	
Per head, For breakfast, lunch, etc., .	—	—	37.5 38.8	82 63	44 39	155 379	
Total per head and day, .	—	—	76.3	125	83	534	
Liver,	500	100	50	175	15	—	FOURTEENTH DAY. { <i>Dinner.</i> — Liver with vegetables, potatoes and beer. { <i>Supper.</i> — Oatmeal in buttermilk.
Splunch,	1,000	15	15	20	2	60	
Potatoes,	2,000	7	14	40	2	400	
Fat,	80	130	10	—	75	—	
Oatmeal,	150	60	9	23	9	96	
Buttermilk,	1,000	6	6	34	10	10	
	—	—	104	292	113	566	
Per head, For breakfast, lunch, etc., .	—	—	35 38.8	97 53	38 39	189 379	
Total per head and day, .	—	—	73.8	150	77	568	

RATIONS OF COMMON FOOD-MATERIALS ESTIMATED TO CONTAIN THE AMOUNTS OF NUTRITIVE INGREDIENTS IN THE STANDARD RATION, WITH COST OF EACH.

The following rations have been calculated by my assistant, Mr. Rockwood, mostly from results of analyses made in our laboratory in behalf of the Smithsonian Institution (U. S. National Museum) as a basis for explanations of its food collection. No other considerable series of analyses of American food-materials has, so far as I am aware, been executed; hence, though the data are meagre they are the best available. They are probably not far out of the way. Mr. Rockwood has endeavored to construct one series of rations at a very low cost, eleven or twelve cents a day or thereabouts, and another series at higher rates, up to forty-five cents a day. Of course it is not proposed that any person or family should attempt to follow these exactly. For that matter the chemist will evidently have to consult the cook if he proposes to construct dietaries to accord with ordinary tastes. The rations will, nevertheless, help to show how foods may be economized, and what proportions

would suffice for the nourishment of ordinary people, and what are the constituents and costs of the different materials. They are estimated to supply very nearly the amounts of nutrients in Voit's standard ration for a laboring man at moderate work.

DAILY RATIONS COMPUTED TO FURNISH NUTRIENTS EQUIVALENT TO THOSE OF STANDARD FOR LABORING MAN AT MODERATE WORK.

Standard Ration : — Protein (118 grams) 0.26 lb.; fats (56 grams) 0.12 lb.; carbohydrates (500 grams) 1.10 lbs.

A. Daily Rations Costing 12 Cents or Less.

FOOD-MATERIALS.			FOOD-MATERIALS.		
KINDS.	Amounts.	Costs.	KINDS.	Amounts.	Costs.
<i>No. 1.</i>			<i>No. 6.</i>		
Beef, neck, . . .	$\frac{1}{4}$ lb.	4 cts.	Smoked herring, . . .	$\frac{1}{2}$ lb.	3 cts.
Beans, . . .	"	$\frac{3}{4}$ "	Potatoes, . . .	1 "	1 "
Potatoes, . . .	2 "	2 "	Beans, . . .	$\frac{1}{4}$ "	$1\frac{1}{2}$ "
Oatmeal, . . .	$\frac{1}{2}$ "	$1\frac{1}{2}$ "	Wheat flour, . . .	1 "	4 "
Butter, . . .	$\frac{1}{2}$ oz.	$1\frac{1}{2}$ "	Butter, . . .	1-16 "	2 "
Rye flour, . . .	$\frac{1}{2}$ lb.	$1\frac{1}{2}$ "			
Total, . . .	—	10 $\frac{1}{2}$ cts.	Total, . . .	—	11 $\frac{1}{2}$ cts.
<i>No. 2.</i>			<i>No. 7, for 3 men.</i>		
Beef, shin, . . .	$\frac{1}{4}$ lb.	3 cts.	Beef, neck, . . .	$\frac{1}{2}$ lb.	4 cts.
Oatmeal, . . .	$\frac{1}{2}$ "	$2\frac{1}{2}$ "	Beef, shin, . . .	$\frac{1}{2}$ "	3 "
Corn meal, . . .	$\frac{1}{2}$ "	1 "	Alewives, . . .	1 "	3 "
Milk, $\frac{1}{2}$ pint, . . .	$\frac{1}{2}$ "	2 "	Beans, . . .	$\frac{1}{4}$ "	$\frac{3}{4}$ "
Potatoes, . . .	1 "	1 "	Milk, $\frac{1}{2}$ pint, . . .	$\frac{1}{2}$ "	2 "
Butter, . . .	1 oz.	2 "	Rye flour, . . .	$\frac{1}{2}$ "	$1\frac{1}{2}$ "
Total, . . .	—	11 $\frac{1}{2}$ cts.	Wheat flour, . . .	$\frac{1}{2}$ "	2 "
<i>No. 3.</i>			Oatmeal, . . .	$\frac{1}{2}$ "	3 $\frac{3}{4}$ "
Herring, . . .	$\frac{1}{4}$ lb.	3 cts.	Corn meal, . . .	1 "	3 "
Oatmeal, . . .	$\frac{1}{2}$ "	$1\frac{1}{2}$ "	Potatoes, . . .	5 "	5 "
Potatoes, . . .	1 "	1 "	Butter, . . .	2 $\frac{3}{4}$ oz.	5 $\frac{1}{2}$ "
Wheat flour, . . .	1 "	4 "			
Butter, . . .	1-16 "	2 "	Total for 3 men, . . .	—	33 $\frac{1}{2}$ cts.
Total, . . .	—	11 $\frac{1}{2}$ cts.	" " 1 man, . . .	—	11 "
<i>No. 4.</i>			<i>No. 8, for 4 men.</i>		
Beef, shin, . . .	$\frac{1}{2}$ lb.	3 cts.	Beef, neck, . . .	$\frac{1}{2}$ lb.	4 cts.
Potatoes, . . .	3 "	3 "	Beef, shin, . . .	$\frac{1}{2}$ "	3 "
Wheat flour, . . .	$\frac{1}{2}$ "	2 "	Rye flour, . . .	$\frac{1}{2}$ "	$1\frac{1}{2}$ "
Beans, . . .	$\frac{1}{2}$ "	$\frac{3}{4}$ "	Sugar, . . .	$1\frac{1}{2}$ oz.	1 "
Butter, . . .	1-16 "	2 "	Oatmeal, . . .	$\frac{1}{2}$ lb.	2 $\frac{1}{2}$ "
Sugar, . . .	1 oz.	1 "	Herring, . . .	1 "	6 "
Total, . . .	—	11 $\frac{1}{2}$ cts.	Beans, . . .	10 oz.	2 $\frac{1}{2}$ "
<i>No. 5.</i>			Wheat flour, . . .	2 $\frac{1}{2}$ lb.	10 "
Alewives, . . .	1 lb.	3 cts.	Potatoes, . . .	7 "	7 "
Potatoes, . . .	2 "	2 "	Butter, . . .	3 $\frac{3}{4}$ oz.	7 $\frac{1}{2}$ "
Corn meal, . . .	$\frac{1}{2}$ "	$1\frac{1}{2}$ "			
Wheat flour, . . .	$\frac{1}{2}$ "	2 "	Total for 4 men, . . .	—	44 $\frac{1}{2}$ cts.
Butter, . . .	1-16 "	2 "	" " 1 man, . . .	—	11 $\frac{1}{4}$ "
Total, . . .	—	10 $\frac{1}{2}$ cts.			

B. Daily Rations Costing from 12 to 15 Cents.

FOOD-MATERIALS.			FOOD-MATERIALS.		
KINDS.	Amounts.	Costs.	KINDS.	Amounts.	Costs.
<i>No. 9.</i>			<i>No. 14.</i>		
Liver,	$\frac{1}{2}$ lb.	5 cts.	Fresh mackerel,	$\frac{3}{4}$ lb.	4 $\frac{1}{2}$ cts.
Potatoes,	1 "	1 "	Potatoes,	1 "	1 "
Butter,	1-16 "	2 "	Cracked wheat,	$\frac{1}{2}$ "	3 "
Corn meal,	1 "	3 "	Corn meal,	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "
Bread,	$\frac{1}{2}$ "	3 "	Beans,	$\frac{1}{4}$ "	2 "
Total,		14 cts.	Butter,	1 oz.	2 "
<i>No. 10.</i>			Total,		12 $\frac{3}{4}$ cts.
Beef, shin,	$\frac{1}{2}$ lb.	3 cts.	<i>No. 15.</i>		
Bread,	$\frac{1}{2}$ "	2 $\frac{1}{2}$ "	Beef, neck,	$\frac{1}{2}$ lb.	4 cts.
Potatoes,	1 "	1 "	Potatoes,	1 "	1 "
Oatmeal,	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	Corn meal,	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "
Corn meal,	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	Rye bread,	1 "	4 "
Butter,	1-16 "	2 "	Butter,	1 oz.	2 "
Sugar,	1-32 "	$\frac{1}{2}$ "	Total,		12 $\frac{1}{2}$ "
Milk,	$\frac{1}{2}$ "	2 "	<i>No. 16, for 3 men.</i>		
Total,		13 $\frac{1}{2}$ cts.	Liver,	$\frac{1}{2}$ lb.	5 cts.
<i>No. 11.</i>			Beef, shin (soup),	$\frac{1}{2}$ "	3 "
Salt cod,	$\frac{1}{2}$ lb.	3 $\frac{1}{2}$ cts.	Salt codfish,	$\frac{1}{2}$ "	3 $\frac{1}{2}$ "
Oatmeal,	$\frac{1}{2}$ "	2 $\frac{1}{2}$ "	Salt pork,	2 oz.	2 "
Corn meal,	$\frac{1}{2}$ "	1 "	Crackers (pilot),	1 lb.	5 $\frac{1}{2}$ "
Milk,	$\frac{1}{2}$ "	2 "	Peanse,	$\frac{1}{2}$ "	3 "
Butter,	1 oz.	2 "	Sugar,	$\frac{1}{2}$ oz.	$\frac{1}{2}$ "
Potatoes,	2 lbs.	2 "	Milk,	$\frac{1}{2}$ lb.	2 "
Total,		13 cts.	Oatmeal,	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "
<i>No. 12.</i>			Potatoes,	2 lbs.	2 "
Pork,	$\frac{1}{2}$ lb.	2 cts.	Bread,	1 "	6 "
Beans,	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	Butter,	2 oz.	4 "
Salt cod,	$\frac{1}{2}$ "	2 "	Corn meal,	1 $\frac{1}{2}$ lb.	4 $\frac{1}{2}$ "
Potatoes,	1 $\frac{1}{2}$ lbs.	1 $\frac{1}{2}$ "	Total for 3 men,		42 cts.
Bread,	1 $\frac{1}{2}$ "	6 "	" " 1 man,		14 "
Total,		12 $\frac{3}{4}$ cts.	<i>No. 17, for 4 men.</i>		
<i>No. 13.</i>			Beef, shin,	$\frac{1}{2}$ lb.	3 cts.
Salt codfish,	$\frac{1}{2}$ lb.	3 $\frac{1}{2}$ cts.	Fresh mackerel,	$\frac{1}{2}$ "	4 $\frac{1}{2}$ "
Salt pork,	2 "	2 "	Salt cod,	$\frac{1}{2}$ "	5 $\frac{1}{2}$ "
Crackers (pilot),	1 "	5 $\frac{1}{2}$ "	Pork,	2 oz.	2 "
Peanse,	$\frac{1}{2}$ "	3 "	Beans,	$\frac{1}{2}$ lb.	1 $\frac{1}{2}$ "
Total,		14 cts.	Wheat bread,	1 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "
			Cracked wheat,	$\frac{1}{2}$ "	3 "
			Corn meal,	1 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "
			Oatmeal,	$\frac{1}{2}$ "	4 "
			Butter,	3 oz.	6 "
			Milk,	$\frac{3}{4}$ lb.	4 "
			Potatoes,	5 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "
			Sugar,	$\frac{1}{2}$ oz.	$\frac{1}{2}$ "
			Total for 4 men,		52 $\frac{1}{2}$ cts.
			" " 1 man,		13 "

C. Daily Rations Costing from 15 to 20 Cents.

FOOD-MATERIALS.			FOOD-MATERIALS.		
KINDS.	Amounts	Costs.	KINDS.	Amounts	Costs.
<i>No. 18.</i>			<i>No. 23, for 3 men.</i>		
Beef, neck,	$\frac{1}{2}$ lb.	2 cts.	Round steak,	$\frac{1}{2}$ lb.	9 cts.
Salt cod,	$\frac{1}{2}$ "	1 "	Beef, neck,	$\frac{1}{2}$ "	2 "
Potatoes,	1 "	3 "	Fresh haddock,	$\frac{1}{2}$ "	3 ½ "
Bread,	$\frac{1}{2}$ "	3 "	Salt cod,	$\frac{1}{2}$ "	1 ½ "
Cabbage,	2 oz.	$\frac{1}{2}$ "	Fat pork,	4 oz.	2 "
Turnips,	2 "	$\frac{1}{2}$ "	Beans,	3 "	9 "
Carrots,	2 "	$\frac{1}{2}$ "	Milk,	2 ½ lbs.	1 "
Oatmeal,	2 "	$\frac{1}{2}$ "	Cheese,	1 oz.	6 "
Milk, 1 pint,	1 lb.	3 ½ "	Butter,	3 "	5 "
Rice,	2 oz.	1 ½ "	Wheat bread,	1 lb.	4 "
Sugar,	2 "	1 ½ "	Rye bread,	1 "	4 "
Corn meal,	$\frac{1}{2}$ lb.	$\frac{1}{2}$ "	Soda crackers,	1 cz.	3 "
Soda crackers,	1 oz.	2 "	Oatmeal,	2 "	1 ½ "
Butter,	1 "	2 "	Corn meal,	7-12 lb.	1 ½ "
Total,		18 cts.	Rice,	2 oz.	1 ½ "
<i>No. 19.</i>			Carrots,	2 "	1 ½ "
Round steak,	$\frac{1}{2}$ lb.	8 cts.	Turnips,	10 "	4 "
Milk,	$\frac{1}{2}$ "	2 "	Potatoes,	4 lbs.	4 "
Butter,	1 oz.	2 "	Cabbage,	2 oz.	3 ½ "
Cheese,	1 "	1 "	Sugar,	5 ½ "	3 ½ "
Bread,	$\frac{1}{2}$ lb.	2 ½ "	Total for 3 men,		46 ½ cts.
Potatoes,	$\frac{1}{2}$ lbs.	1 "	" " 1 man,		15 "
Sugar,	$\frac{1}{2}$ oz.	1 "	<i>No. 24, for 3 men.</i>		
Turnips,	$\frac{1}{2}$ lb.	1 "	Round steak,	$\frac{1}{2}$ lb.	9 cts.
Corn meal,	$\frac{1}{2}$ "	1 "	Beef, shin (soup),	$\frac{1}{2}$ "	1 ½ "
Total,	-	19 ½ cts.	Fat pork,	1 oz.	1 "
<i>No. 20.</i>			Fresh cod,	$\frac{1}{2}$ lb.	4 "
Beef, shin,	$\frac{1}{2}$ lb.	1 ½ cts.	Cheese,	1 oz.	1 "
Fresh cod,	$\frac{1}{2}$ "	4 "	Milk,	1 lb.	3 ½ "
Oatmeal,	$\frac{1}{2}$ "	3 "	Beans,	$\frac{1}{2}$ "	5 "
Bread,	$\frac{1}{2}$ "	3 "	Pease,	$\frac{1}{2}$ "	2 ½ "
Butter,	1 oz.	2 "	Wheat bread,	1 ½ "	7 ½ "
Potatoes,	1 lb.	1 "	Rye bread,	$\frac{1}{2}$ "	2 "
Boston crackers,	2 oz.	1 ½ "	Boston crackers,	2 oz.	1 ½ "
Milk, $\frac{1}{2}$ pint,	$\frac{1}{2}$ lb.	1 ½ "	Oatmeal,	2 "	2 "
Corn meal,	$\frac{1}{2}$ "	1 ½ "	Corn meal,	5-6 lb.	2 ½ "
Total,	-	16 ½ cts.	Potatoes,	2 ½ "	2 ½ "
<i>No. 21.</i>			Turnips,	3 oz.	6 "
Beef, neck,	$\frac{1}{2}$ lb.	4 ½ cts.	Butter,	$\frac{1}{2}$ "	2 ½ "
Milk,	$\frac{1}{2}$ "	2 "	Sugar,	3 ½ "	2 ½ "
Cheese,	1 oz.	1 "	Total for 3 men,		53 ½ cts.
Bread,	1 lb.	5 "	" " 1 man,		18 "
Potatoes,	2 "	2 "	<i>No. 25, for 4 men.</i>		
Sugar,	1 ½ oz.	1 "	Round steak,	$\frac{1}{2}$ lb.	9 cts.
Total,	-	15 ½ cts.	Beef, shin (soup),	$\frac{1}{2}$ "	1 ½ "
<i>No. 22.</i>			Beef, neck,	$\frac{1}{2}$ "	2 "
Pork,	$\frac{1}{2}$ oz.	$\frac{1}{2}$ cts.	Fresh cod,	1 "	8 "
Beans,	3 "	2 "	Salt cod,	$\frac{1}{2}$ "	1 ½ "
Fresh cod,	$\frac{1}{2}$ lb.	3 ½ "	Pork,	$\frac{1}{2}$ oz.	$\frac{1}{2}$ "
Potatoes,	$\frac{1}{2}$ lbs.	1 ½ "	Beans,	$\frac{1}{2}$ lb.	5 "
Rye bread,	1 "	4 "	Wheat bread,	1 ½ "	8 "
Butter,	1 oz.	2 "	Rye bread,	1 "	4 "
Sugar,	2 "	1 ½ "	Boston crackers,	2 oz.	1 ½ "
Milk,	1 lb.	3 ½ "	Soda crackers,	1 "	3 "
Total,	-	18 ½ cts.	Oatmeal,	1 lb.	5 "
			Corn meal,	3 "	2 ½ "
			Rice,	2 oz.	1 ½ "
			Potatoes,	5 ½ lbs.	5 ½ "
			Cabbage,	2 oz.	1 "
			Turnips,	2 "	1 "
			Carrots,	2 "	1 "
			Butter,	3 "	6 "
			Milk,	2 ½ lbs.	7 ½ "
			Sugar,	3 ½ oz.	2 ½ "
			Total for 4 men,	-	71 ½ cts.
			" " 1 man,		18 "

D. Daily Rations Costing from 20 to 45 Cents.

FOOD-MATERIALS.			FOOD-MATERIALS.		
KINDS.	Amounts.	Costs.	KINDS.	Amounts.	Costs.
<i>No. 26.</i>			<i>No. 29.</i>		
Beef (soup),	$\frac{3}{4}$ lb.	6 cts.	Mutton, leg,	$\frac{1}{2}$ lb.	4 cts.
Potatoes,	1 " "	1 " "	Oysters,	" "	10 " "
Bread,	$\frac{1}{2}$ " "	3 " "	Pease,	" "	1 $\frac{1}{2}$ " "
Cabbage,	2 oz.	$\frac{1}{2}$ " "	Potatoes,	1 " "	1 " "
Turnips,	$\frac{1}{2}$ " "	$\frac{1}{2}$ " "	Oatmeal,	$\frac{1}{2}$ " "	1 " "
Carrots,	2 " "	" "	Rice,	$\frac{1}{2}$ " "	2 $\frac{1}{2}$ " "
Oatmeal,	2 " "	" "	Bread,	" "	3 " "
Milk,	1 lb.	3 " "	Oyster crackers,	" "	3 " "
Rice,	2 oz.	1 $\frac{1}{2}$ " "	Butter,	1 $\frac{1}{2}$ oz.	3 " "
Sugar,	2 " "	1 $\frac{1}{2}$ " "	Total,		28 $\frac{1}{2}$ cts.
Corn meal,	$\frac{1}{2}$ lb.	$\frac{1}{2}$ " "			
Soda crackers,	2 oz.	3 " "	<i>No. 30.</i>		
Butter,	1 " "	2 " "	Turkey,	$\frac{1}{2}$ lb.	18 cts.
Total,		20 $\frac{1}{2}$ cts.	Fresh pork,	2 oz.	1 $\frac{1}{2}$ " "
<i>No. 27.</i>			Hominy,	$\frac{1}{2}$ lb.	2 " "
Shad,	$\frac{1}{2}$ lb.	4 cts.	Potatoes,	1 " "	1 $\frac{1}{2}$ " "
Eggs,	$\frac{1}{2}$ " "	4 " "	Beans,	$\frac{1}{4}$ " "	3 " "
Oatmeal,	2 oz.	1 $\frac{1}{2}$ " "	Rye bread,	$\frac{1}{4}$ " "	3 $\frac{1}{2}$ " "
Rice,	2 " "	1 $\frac{1}{2}$ " "	Milk,	1 " "	3 $\frac{1}{2}$ " "
Beans,	$\frac{1}{2}$ lb.	1 $\frac{1}{2}$ " "	Total,		30 $\frac{1}{2}$ cts.
Bread,	$\frac{1}{2}$ " "	3 " "			
Potatoes,	1 " "	1 " "	<i>No. 31.</i>		
Soda crackers,	$\frac{1}{2}$ " "	2 $\frac{1}{2}$ " "	Beef, sirloin,	$\frac{1}{2}$ lb.	5 cts.
Sugar,	2 oz.	1 $\frac{1}{2}$ " "	Potatoes,	$\frac{1}{2}$ " "	3 " "
Butter,	1 " "	2 " "	Bread,	1 " "	6 " "
Total,		21 $\frac{1}{2}$ cts.	Butter,	1 oz.	2 " "
<i>No. 28.</i>			Sugar,	$\frac{1}{2}$ lb.	2 $\frac{1}{2}$ " "
Beef, round,	$\frac{1}{2}$ lb.	4 $\frac{1}{2}$ cts.	Beans,	$\frac{1}{4}$ " "	2 $\frac{1}{2}$ " "
Shad,	" "	4 " "	Skimmed milk,	1 " "	2 " "
Pease,	" "	2 $\frac{1}{2}$ " "	Oysters,	$\frac{1}{2}$ " "	20 " "
Potatoes,	" "	$\frac{1}{2}$ " "	Total,		43 cts.
Cauliflower,	" "	6 " "			
Rice,	" "	3 " "	<i>No. 32.</i>		
Oyster crackers,	" "	5 " "	Salmon,	$\frac{1}{2}$ lb.	10 cts.
Sugar,	" "	2 $\frac{1}{2}$ " "	Beef, sirloin,	" "	5 " "
Butter,	1 oz.	2 " "	Oysters,	" "	10 " "
Total,		29 $\frac{1}{2}$ cts.	Dried beef,	1 oz.	1 " "
			Wheat bread,	$\frac{1}{2}$ lb.	3 " "
			Oatmeal,	2 oz.	8 " "
			Rice,	2 " "	1 $\frac{1}{2}$ " "
			Potatoes,	$\frac{1}{2}$ lb.	6 " "
			Sweet potatoes,	1 " "	6 " "
			Cabbage,	2 oz.	$\frac{1}{2}$ " "
			Turnips,	2 " "	8 " "
			Butter,	2 " "	2 " "
			Milk,	1 lb.	3 $\frac{1}{2}$ " "
			Sugar,	2 oz.	1 $\frac{1}{2}$ " "
			Total,		45 cts.

[Since the delivery of the above address, Hon. Carroll D. Wright, the President of the Convention, has asked me in what form the statistics of dietaries of the people would be most valuable as data for determining the actual amounts of nutritive material consumed. The following brief statement suggests some points in answer to this question.

If the pecuniary cost of the dietary is the only, or the principal matter to be considered, the statement of the total

amounts of meats, vegetables, and other food-materials purchased may suffice. If, however, it be desired to determine the actual nutritive value of the dietary, and with this to answer the question whether the amounts of the several classes of nutrients, protein, fats and carbohydrates, are insufficient, excessive or properly adapted to the needs of the consumer, the statements should be of such sort as to permit a reasonably accurate estimate of the actual amounts of nutrients in the food. It is likewise important to know whether all the food is actually eaten, or whether a part of it is wasted.

It is accordingly essential that the amounts of each of the food-materials should be stated in pounds. The legal bushel for certain articles may have one weight in one State, and a different weight in another State. When a chemist is told that the dietary includes so many bunches of onions or cans of corn, though he may know the average composition of corn and onions as they ordinarily grow, he is at a loss to tell how much of the nutritive materials the dietary contained, because of this lack of definiteness in the statement of the amounts of materials. If the statement is made that a family consumed so many pounds of beef in a year, he is again unable to estimate the amounts of nutrients it contained, because there are such wide differences in the composition of beef of various kinds, and especially in the portions or "cuts," as the butchers call them, from the different parts of the same animal. A glance at the tables of composition of food-materials given in the address above will illustrate this point. I have been much perplexed in some attempts toward calculating the nutritive materials in dietaries from the fact that the amounts and kinds of materials are not stated with such definiteness as to permit an at all satisfactory estimate of their composition. In brief, if it is desired to ascertain the actual dietetic value of the food, or its fitness for the needs of the consumer, or if we seek an answer to the question as to whether it contains nutrients in proper amounts and proportions, and how it might be altered so as to make it better for his nourishment or for his purse, the weight of each food-material, and as complete a description as possible of each article, should be

given. That an accurate estimate of any given dietary is possible even with data in the form suggested is, of course, not to be assumed. The only way to determine the exact amount of nutrients is to analyze the food actually consumed. But if the statistician's figures and descriptions are reasonably accurate and detailed, an at least approximate calculation of the composition is possible.]

During and after the remarks of Prof. Atwater, which were delivered for the most part without notes, a general but informal discussion prevailed on the interesting facts brought to light by his investigations, and the cordial thanks of the convention were tendered him at the close for the valuable information he had imparted.

Mr. WRIGHT, as chairman of the committee appointed at the last meeting of the convention to memorialize Congress in regard to the then proposed intermediary census, reported that a memorial had been drawn up by the committee. This was printed in the proceedings of the last convention and the gentlemen were familiar with it. A copy of this was forwarded to Hon. S. S. Cox, Chairman of the House Committee on Census. Subsequently Mr. Wright appeared before the Congressional committee at the request of the chairman, and took occasion to explain the difficulties which would be encountered by the different States if they attempted to avail themselves of the provisions of Section 22 of the Act of March 3, 1879, and urged the passage of such a bill as had been introduced by Mr. Cox, which should make it feasible for the several States to join the general government in taking a census for 1885.

Although Congress has failed to act in the matter, Mr. Wright believed that the suggestions of this convention would receive recognition in the future at Washington, when preparations should be made for the census of 1890.

Before that time, however, the representatives of the State bureaus should formulate a plan of coöperation with the federal authorities in that work. He believed the United States Census Bureau had been more successful with the statistics of population than with those of manufactures, and that the State bureaus, with the experience they would then have

attained, would be able to assist the general government to the most valuable industrial statistics yet obtained.

On motion of Mr. Peelle of Indiana, the present committee, consisting of Messrs. Wright, Lord and Peck, was requested to continue to act for the convention in all matters pertaining to the census.

Adjourned until two o'clock P.M.

AFTERNOON SESSION—THIRD DAY.

Upon reassembling, the convention took up the subject which had been made the special order for the hour, to wit: the relations between the National bureau, recently established in Washington, and the State bureaus.

Upon this subject, Mr. Wright, as Commissioner of the National bureau, made the following statement in regard to his position in Washington, and his wishes and purposes for the future:—

THE WORK OF THE UNITED STATES BUREAU OF LABOR.

ADDRESS BY HON. CARROLL D. WRIGHT, PRESIDENT OF THE CONVENTION.

MR. PRESIDENT: The work of the National Bureau of Labor, or, as it is really known, the United States Bureau of Labor, is one in which we are all interested, and in which we were interested before the creation of the bureau.

It has been my good fortune, as chief of the Massachusetts Bureau of Statistics of Labor, to have the friendship, and, I am glad to say, the confidence, of the workingmen of Massachusetts, but there has been one point on which they have differed from me, and still differ, and that is in regard to the methods which I have adopted in administering the affairs of the bureau. This difference is sure to constitute a very important factor in the administration of the United States Bureau, and it lies in this, that our labor reformers in Massachusetts—and we have some very able men among them, earnest, honest men—have always felt that the bureau should be conducted as a means for agitating or discussing propositions for the amelioration of the condition of

the working classes, rather than for the mere collection and presentation of facts.

It is just here that we differ, even on questions where I have been in the fullest sympathy with them, and for this reason on my part: If a Bureau of Statistics of Labor presents facts, those facts will show their bearing and constitute the strongest arguments. If the bureau should simply present arguments even with the facts, or use its reports in agitating legislative reforms, it becomes an advocate, and necessarily partisan in its views, and could expect to have but little weight attached to its conclusions.

To illustrate this let me refer you to one piece of work of the Massachusetts Bureau, and one piece of proposed work for this year of the United States Bureau.

The Commonwealth of Massachusetts enacted a ten-hour law in 1874, and many manufacturers immediately took the ground that it would drive capital out of the State; that our State would be at a disadvantage in relation to the States around us in the manufacture of the same kind of goods; and they insisted that other States should adopt the ten-hour law. They were logically correct in this if they were correct in their first proposition, because if other States enacted a ten-hour law then there would be an equality as far as New England is concerned in regard to the working day. The other States said that Massachusetts manufacturers were like the peacock who lost his tail feathers, and wanted all the other peacocks to adopt the same form because it was the proper thing to do.

This question attracted a good deal of attention in Rhode Island, Connecticut and other States, until a few years ago the Massachusetts Legislature directed me to investigate the question of uniform hours of labor throughout New England and New York. It was shown, as the result of this investigation, that the Massachusetts textile manufacturers, on ten hours a day, produced more goods per man, spindle or loom, than any of the States with which she competed, and not only this, but that the wages paid under the ten-hour system were greater than in any other of the States running eleven and twelve hours per day.

Now, that little statement of fact, which could not be con-

troverted, had a far wider and more specific influence, and carried a far greater weight, than all the arguments not having that fact to go upon, which the bureau could have produced or given to the public purely on a theoretical basis. This clearly illustrates my point.

Another illustration you will find in the second article of instructions which I have given to special agents of the United States Bureau, which relates to the collection of data bearing on the employment of foreign contract labor.

Problematically, what would be the result of the facts gathered under that article? Congress has passed a law recently in relation to that subject, so perhaps the question as a question is settled in one direction, but not in a moral direction.

Let me suppose that this investigation shows four things: first, that the imported laborer has not been benefited by the importation; second, that the domestic laborer, who has been displaced by the imported man, has not been benefited; third, that the contractor himself has lost money; fourth, that the consumer of the goods produced by the contract laborer does not get his material any less. If these four things should be shown you have settled the question of the employment of foreign contract labor. How much more conclusive, and how much more potent in discussing that question are the facts, when shown, than all the theoretical agitation of the contract foreign labor question that you can print.

For these reasons I believe it is the duty of these bureaus to follow the historic method everywhere, and the historic method is the scientific method, and that is the consideration of theories or subjects based on recorded facts, and it does not matter, gentlemen, whether the facts were recorded last night, or 35 years or 40 years ago. The moment they are recorded they belong to the historic method of economics. For these reasons I have always differed from the labor reformers of Massachusetts, as I shall differ from the labor reformers of the United States in the administration of the United States Bureau.

On assuming the position of commissioner of labor at Washington I directed a letter to the Secretary of the In-

terior defining the policy of the bureau as I should conduct it. In that letter, I said: "declaring this, then, to be the positive policy of the Bureau of Labor, this office makes its initial work that of pure fact; and any desire on the part of individuals or of associations of individuals, whether of labor or of capital, seeking more or less than this policy indicates, must be considered as their wanting the work of the Bureau to conform to adopted theories or to be influential in shaping special ends. This being the case, I trust that this policy will meet the approval of all engaged in carrying on the industrial enterprises of the country, as well as of the Government which has so generously established the Bureau; and I assure you that no other policy can bring success, but that any variance from that declared will result in failure."

I further said, "it should be remembered that a Bureau of Labor cannot solve social or industrial problems, nor can it bring direct returns in a material way to the citizens of a country, but its work must be classed among educational efforts, and by judicious investigations and the fearless publication of the results thereof, it may and should enable the people to more clearly and more fully comprehend many of the problems which now vex them."

Now, Mr. President, I believe this to be the true policy of the United States Bureau of Labor. If I am wrong, the first year's work will disclose the error; if I am right, the first year's work must determine the correctness of my position. This position is taken, Mr. President, not in antagonism to the demands, requests, or theories of anybody. It does not matter to a scientific man what he shows; he should only be gratified at arriving at the truth; the fact that he arrives at the truth should be sufficient reward for him, without reference to the toes he treads on, whether his own or others', and if he is not big enough to acknowledge the fact that he is wrong when wrong, he is not fit to be at the head of a bureau. It has become a habit with me to abide by the fact itself without reference to its bearing. It is upon this basis that the State bureau has secured whatever success has attended it.

I am happy to know that many members of the great labor

organizations of the country have endorsed this policy, and the President and the Secretary of the Interior desire to see the bureau administered under it, and are thoroughly in sympathy with it, and will back up the Bureau of Labor in carrying out such a policy.

This much in explaining to you what seems to me to be the true policy of the United States Bureau. Now, what should be its practical work?

In the first place, it starts out with only eight months in which to do a year's work. It was necessary, therefore, to make its investigations in some specific direction in order to present a valuable report to Congress at its next session. The great difficulty I have had so far in Washington has been in meeting the requests of people to investigate this, that, or the other matter. If we had scattered our forces and investigated the convict labor question, or the condition of the negro in the South, or on the other hand followed the requests of the temperance organizations, or taken up various other vital matters involving the best interests of this country, what would have been the value of the first report of the bureau? Recognizing the value of this year's work, especially, I chose the question of industrial depressions, not having the ambition or conceit to think that we could develop the real causes of industrial depressions, but feeling that we could develop all the alleged causes and classify them, and learn the influence of each, and develop as actual facts whether industrial depressions are contemporaneous in all countries, and whether the severity of depressions in this country is as intense as in others; we could develop these as facts, and a vast deal of material that has collateral bearing on others, and with the hearty approval of Secretary Lamar I adopted this plan and we are bending all our efforts to this question.

In a general way State bureaus can co-operate with the United States bureau, and can add to their State influence by supporting and upholding the work of the United States bureau, and I am sure the State bureaus can see that if they can aid the work of the United States bureau, that office can, to a very large degree, not only aid them, but be of

great service in perfecting their work, and in aiding in the creation of new bureaus.

I have it in mind, before another year comes around, to ask Congress to provide that all State bureaus, the State legislatures consenting, shall be considered the associates of the United States bureau, on some proper basis, and that all the services that may be rendered by the State bureaus to the United States bureau shall be properly paid for. With such associates throughout the country the United States bureau would be able to bring some of the most important features of each of the State reports into one report, and so bring the results of the investigations of the different bureaus into national importance, bring them into crystallized and scientific form, and send them over the country and over the world as the best product of the many original investigations of the United States. You should each bear in mind that in all this work the bureaus of the United States occupy a new and a distinct place in sociology.

It is only recently that the countries of Europe have begun to agitate the question of establishing bureaus of labor. Belgium has created such a bureau, France is discussing the question, and it will not be more than five years before the English government will establish an office on the basis of the American Bureau of Statistics of Labor.

The United States take the lead in this as they took the lead in a national periodical census. The United States government was the first to establish a periodical census of the people; this was done by the constitution, and having set that example to the world, we have set this other example of the government making original investigations into the condition of the people, and all that relates to their welfare.

These bureaus represent a novel feature in the social questions of the world. The reports from nearly all the States having them are quoted in Europe more than you are aware of. They sometimes find their way into Parliament and are used by the House of Commons, by the economists and others who have seats there, and are used to show the British Government that they are falling short in making investigations into the condition of the people.

With our United States bureau working in harmony with

the State bureaus you easily see what a power the whole chain is to become in developing the industrial forces of our country, and not to the United States alone, but to the world, for what is for our welfare is for the welfare of England, France, Germany and Belgium, and other industrial nations; we must not confine our work to the limits of the United States.

With this comprehensive view of the work of all these bureaus we should dedicate ourselves to the very best kind of labor and the best kind of work we can possibly undertake, and such as shall be entitled to the very best efforts of our minds. It is not likely that these bureaus have been created to gratify a fancy, or a notion; they have been created to meet the great demand, not a specific demand, but a great general demand, for clearly defined, thoroughly classified information. If there is any one thing this age calls for more than any preceding, it is in the demand for classified, clearly defined, accurate information. As General Walker has said, this desire on the part of the people leads them to catch up anything in the shape of statistics with an avidity which becomes pathetic at times. This tendency should be a warning to all engaged in conducting original investigations, and from which statistical data may be drawn. This desire demands that each one of us shall aid in the co-operative work of the United States and State bureaus, in such manner as shall lead to great good to the whole body of workers, and in no way to the damage of any.

The specific ways in which the two branches can co-operate, the Federal and the State departments of labor statistics if you choose to call them such, are many. Take this one question which Mr. Atkinson and Mr. Atwater have so ably presented to us. You will see by the instructions that all the agents of the United States Bureau, both here and in Europe, are collecting statistics in regard to a standard ration. Such statistics will come from the great manufacturing centres of Europe as well as of the United States. All those State Bureaus which see fit to canvass that question to a small degree only add to the valuable information which the United States Bureau will gather. It is not right that such information be "exclusive"; it is right to disseminate

it and so as it is published by one and another it becomes nationalized in its importance, and we can have as great a power for good as does the Bureau of Education at Washington which has developed into a great institution, having all the State Boards of Education to aid its work, the results reaching teachers and educators, but not to a great extent the people. The work we have in hand is to reach in an educational way the people themselves, so whatever we can carry from one to another in aiding one another is aiding our great work itself, and in this way we can cover most thoroughly the work to be done. There need be no jealousies, and no envies, and I know there will not be. No chief should care who makes the best report, nor who accomplishes the most; the question is, has the work been done in the cause of humanity? and not whether one has made a better report than another; each should be proud that the product is of the association, and not of himself, and each should be ready to give credit to his associates wherever credit is due.

The beauty of all this, my friends, is that we are establishing a powerful chain, not of place holders, not of salaried men, but a powerful chain of investigators whose efforts will be recognized by the people at large as benefiting the public. We must not indulge in theories or speculations, but if one of us comes to a conclusion through ascertained facts, that conclusion should be so clearly stated, and so well backed by details that it is the conclusion of the public as well. It has been my aim for many years to so conduct our State work, that no man should be able to say anything of my report beyond this, "It is false." I would not allow a man to get beyond the simple statement, that the chief of the Massachusetts Bureau is a liar. If the critic proves that I am a liar then the whole fabric of my work falls, but so long as he can only say the bureau lies, that does not trouble me, but should he show facts which prove my statements to be wrong, then I should lose heart for the work. It should be the ambition of us all to be able to state to our Legislatures the facts, and so conclusively and so in detail, that no man can stand up and dispute them. Make them authority the world over, and we can do this by hearty co-operation,

by each helping the other, as simply a means, not helping each other as men, but aiding the work which has been set us to do.

Another way in which the Federal and State Bureaus can co-operate and from which the larger benefit would come to the State Bureaus is through the facility with which the United States Bureau can aid in furnishing you with material. Everything that comes into our till at Washington, from our own or any other government, for distribution, will be supplied to State Bureaus. This costs nothing but effort and consideration, and even if it did cost this should be done. If Congress publishes a report of interest to you, you will be supplied with it; also, if reports come from foreign countries you will be supplied, and thereby you will have somebody in Washington to see that you get these things. You cannot always get them, or know of their existence, through Congressmen as they cannot always pay the proper attention to your requests. The monographs that have been published by the Department of the Interior, although they are published originally in the great census volumes, would be of great value to you; all such publications should be sent you at once. This will be part of our duty. On the other hand if anything comes up in your respective States that suggests investigation, consideration, or examination, over the whole country, the United States Bureau ought to expect that you will immediately inform it, so that through its agencies in other States where there are no Bureaus, like information can be gathered; we can thus come to a broad basis of presenting information, so far as it influences the whole country. In this way we can co-operate most thoroughly.

Another way in which we can work together would be through local agents. Suppose the United States Bureau should be allowed by Congress to consider all the State Bureaus as its associates; that would require action on the part of the State Legislatures also to allow State Bureaus to be so considered; but I see nothing inconsistent in this course. To make such a system complete Congress should allow the United States Bureau to have local agents in the States where no bureaus exist. You see the result would be that in each State, or each cluster of States, we should have

somebody to furnish us with information. We should soon see the fruits of such a chain of interests in the industrial matters of the country. If a disturbance occurs the cause can be reported. If anything else occurs it can be noted, and so the United States Bureau could through its bulletins keep the people of the country constantly informed of industrial matters and events. You know from experience in your individual States that an annual report cannot, with any great propriety, deal with passing events. The press deals with passing events; by the time a report can deal with them the people do not care anything about them.

These bureaus become historical in their efforts. We must have in mind the man living fifty years hence, and we must do our work so that he can use it. If you read the history of any country you find the chief lack is in the treatment of the power of industrial forces in the progress of the nation. Only a few historians, and they are exceedingly rare, have touched this problem at all. They have dealt with administrations, with reigns, wars, and conquests, but they have left out the industrial forces that have made conquests over nature, forces which constitute a nation. Mr. Green in England, and Mr. McMaster in the United States, are trying to correct this lack in history, but the men who will correct this for the present time are the men who deal with industrial statistics and supply the facts in such detail that the writers of history in the years to come shall feel grateful to them that they did their work conscientiously and thoroughly. So you see that all the facts presented are of historical as well as of immediate value.

There are two great lines of statistics; one of worth and one worthless.

The line of worth may not have the greatest amount of interest; on the other hand the worthless may be the most interesting. For instance, it might be exceedingly interesting to know how many men in the country weigh over 200 pounds and have crooked noses, but the knowledge would be of no great value. In this direction the heads of bureaus must be exceedingly discreet and judicious; they must draw the line between valuable and simply interesting statistics. The interesting statistics may be the most popular, but it is

a useless expenditure of money to collect them. So far, the United States bureaus have been quite free from this fault.

Now these lines of co-operation, among many others, Mr. President, seem to me to be exceedingly valuable, and they need not conflict with the views of any man at the head of any one of the State bureaus. I think, so far as I know, the officers of the different bureaus, while they represent an exceedingly wide range of thought, have adhered to the policy outlined at the beginning to the best of their ability. I do not remember of reading in any of your reports arguments used simply for the sake of arguments. The recommendations of a bureau have no power, and have no weight upon a legislature, unless they come as a supplement to positive and original investigation of facts.

As original investigators we occupy a novel place, as I have said, and this novel place will soon become a familiar one. It is recognized now as one of the features of our State and federal governments.

If you can with conscientiousness and without scruple pledge your co-operation, as we did a year ago, with the Bureau of Labor at Washington, without reference to whose hands it may be in, so far as its affairs may be conscientiously administered, I now have the privilege of pledging you the hearty co-operation of the Federal Bureau in return, and if we can conduct all the bureaus substantially upon the basis I have named, if we can admit into our work standards which shall elevate the labor question to much broader and more comprehensive grounds than those which generally surround it, we shall have done the working forces of our country a great and a lasting service.

Take the work of Mr. Atkinson: it is not of the slightest importance whether we agree with him or not, or as an illustration, whether he stated the truth; he did give us an original line of investigation, and if carried out by us one which must be of great benefit to the people of the United States. The suggestions of Mr. Atkinson have been supplemented splendidly by Mr. Atwater on the food problem of the labor question, which is all the questions of progress knitted together. We must recognize the fact that the lines must be attacked all along and at every point, and that we

cannot by a report or by an act of the legislature correct the wrongs we know exist; but we can find the facts of the wrongs all along the line, and by earnest, hearty co-operation, we can see the whole line affected after a while, as in fact it is already affected. The diffusion of knowledge regarding the relations of labor and capital, of the laborer and the capitalist, will change, is changing, the public mind. As an instance: while ten years ago but few men recognized the inherent right of a man or a body of men to strike, such right is now freely admitted. I am not speaking of the judiciousness of strikes, or of the welfare of those who engage in them, or of the wrongs often perpetrated through them, but simply of the inherent right to strike. Not only does the public admit this right to-day, but in very many cases public sympathy is with the striker. The right to strike seems to be one of the elements of industrial progress, and the result is sure to be that we will have no strikes, for the time is rapidly approaching when the public will hold the employer, in a large proportion of cases, responsible for a strike. This result will not come through fighting and violent revolutions, but through a better understanding of the economic relations of labor and capital, and of the reciprocal relations of laborers and capitalists. There are many works where a strike never occurs, and where, if one did, the proprietors would consider their administration at fault. Such men recognize the power of moral forces. This indicates our duty as investigators, and clearly indicates the good which can and which must accrue from the constant and impartial presentation of facts relative to industrial affairs.

Our work has now become national. It has been taken out of the line of local effort and promoted to the dignity of national work. By conscientious service only can it succeed.

If I have given you a wide field I trust it is not too wide. If we have taken a large contract I trust it is not so large that we cannot carry it out faithfully, fully, and to the great good of the generous public which has made our labors possible.

Let us feel that the greatest disgrace that can come to the service which demands our loyalty, is the discontinuance of one only of the bureaus of labor in the United States.

At the close of Mr. Wright's remarks, Mr. Hutchins, of Iowa, offered the following resolution, as an expression of the sentiment of the convention, whose members were about equally divided as to their political affiliations : —

Whereas, This Convention of the Chiefs and Commissioners of the Bureaus of Statistics of Labor in the United States recognize that the office of Commissioner of the United States Bureau of Labor is one demanding a high order of technical abilities combined with earnest devotion to the welfare of the industrial classes; and

Whereas, The successful administration of the affairs of that Bureau depend upon the possession of those qualities by the Commissioner rather than upon his personal political inclinations; therefore,

Resolved, That we hereby express our sincere gratification with the appointment of, and continuance in that office, of the Hon. Carroll D. Wright of Massachusetts, and we pledge to him our cordial support and coöperation in the exercise of his official duties.

This resolution was adopted by the convention without discussion or dissent.

MR. WRIGHT thanked the members for this expression of confidence in the Commissioner of the National Bureau. He assured them that President Cleveland and Secretary Lamar were in hearty sympathy with the policy of the bureau as already mapped out, and that political considerations had not been and would not be entertained in the management of the affairs of the bureau. He spoke, not as an appointee of the preceding administration, but as an officer having the cordial support of the present.

THE HON. J. SIMPSON AFRICA, Secretary of Internal Affairs of Pennsylvania, the guest of the convention, also presented the following resolution. In asking its adoption he begged to express his personal gratification both with the courtesy extended to himself, and with the evidences of sincere and successful work, in a most important field, which had been presented to him during this session of the convention. He felt that something was due to Col. Wright for his personal courtesies to the members, and desired to give the following expression to it : —

Resolved, That the representatives of the several State Bureaus of Labor Statistics hereby express their acknowledgments to the Hon. Carroll D. Wright, Commissioner of the National Bureau of Labor, and Chief of the Bureau of Statistics of Labor of Massachusetts, for the valuable information imparted relative to the methods and results of the State Census of

Massachusetts now in progress, as well as for his courtesy in escorting those in attendance upon the convention to many points of interest in this historic city of Boston and its environs; also to the representatives of the press for their full reports of the proceedings of the convention.

Resolution adopted.

The remaining hour of the session was occupied by a general discussion on various topics, including, coöperation, strikes, and convict labor.

Mr. Bishop urged the importance of instructing workingmen in the principles of coöperation, more particularly those of distributive coöperation. Productive enterprises on a large scale were usually impracticable, but the great majority of industrial communities could unite in the purchase and sale of supplies by and among themselves to their mutual advantage and profit. Several experiments of this kind were in successful operation in New Jersey, and there was a tendency to extend such efforts.

Mr. Wright stated that the Legislature of Massachusetts had authorized the publication by himself of a Manual on Coöperation for the special instruction of workingmen on that subject. For this purpose an appropriation of \$1,800 had been made, and he believed such a pamphlet would prove an educational factor of great value.

Some accounts of strikes in the various States, and of their causes, management and consequences was also given, and reports on the progress which was being made in the attempt to abolish the contracting of convict labor, when the President called upon the Rev. Jesse H. Jones of Abington, who had been in attendance, to address the members.

In reply Mr. JONES regretted his lack of preparation, but desired to congratulate the gentlemen on the work in which they were engaged, and pronounced it second in importance to none of the instrumentalities now being employed for the advancement of civilization. The most momentous questions of the day were those which were occupying the time and thought of the gentlemen present, and although in our day no ultimate solutions might be reached, every effort in that direction was affording additional enlightenment, and contributing to the better adjustment of social relations. He desired to see bureaus of inquiry and investigations on

these economic subjects fostered, and was gratified to see representatives of so many of them present.

A few closing remarks were then offered by the President when the convention adjourned *sine die*.

JOHN S. LORD,
Secretary.

APPENDIX.

Copies of the Acts creating Bureaus of Statistics of Labor in the States of Connecticut and Kansas are here appended: —

AN ACT

ESTABLISHING A BUREAU OF LABOR STATISTICS IN THE STATE OF CONNECTICUT.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. There is hereby created a bureau of labor statistics to be under the control and management of the commissioner thereof to be appointed as hereinafter provided.

SECT. 2. The governor shall appoint a commissioner of the bureau of labor statistics, who shall hold his office from the first day of July, 1885, till the first day of July, 1887, and until his successor is appointed and qualified. The governor shall, with the consent of the Senate, within sixty days after the organization of the general assembly in January, 1887, and every four years thereafter, appoint a commissioner of said bureau, who shall hold his office from the first day of the succeeding July, for a term of four years, and until his successor is appointed and qualified. In case of vacancy in the office of commissioner, through death, resignation, inability, or removal, the governor shall fill the same until filled in the manner above provided for the appointment of commissioner, and the governor may remove the commissioner for cause.

SECT. 3. Said commissioner shall receive a salary of two thousand dollars per annum, and the necessary postage, stationery and office expenses of said bureau shall be paid by the state upon estimate of the comptroller in the same manner as the expenses of other departments of the state government.

SECT. 4. The comptroller shall provide suitable rooms in the capitol at Hartford for the use of said bureau. The commissioner may appoint and remove at pleasure one clerk of said bureau, who shall receive the same compensation as the chief clerk of the board of railroad commissioners.

SECT. 5. The commissioner shall collect information upon the subject of labor, its relation to capital, the hours of labor, and the earnings of laboring men and women, and the means of promoting their material, social, intellectual, and moral prosperity; but for this purpose persons shall not be required to leave the vicinity of their residences or places of business.

SECT. 6. The commissioner shall report to the governor, on or before the first day of December in each year, all the statistical details relating to the business of his department, and such report shall be printed for the use of the general assembly at each of its regular sessions.

Approved April 23, 1885.

AN ACT

CREATING A BUREAU OF LABOR AND INDUSTRIAL STATISTICS, AND DEFINING THE POWERS AND DUTIES OF THE SAME, AND FIXING THE SALARY OF THE COMMISSIONER.

Be it enacted by the Legislature of the State of Kansas :

SECTION 1. There is hereby established a bureau of labor and industrial statistics of the State of Kansas.

SECT. 2. It shall be the duty of said bureau to collect, assort, systematize, and present in annual reports to the governor, to be by him biennially transmitted to the legislature, statistical details relating to all departments of labor and industrial pursuits in the State, especially in their relation to the commercial, industrial, social, educational and sanitary condition of the laboring classes, and to the permanent prosperity of the productive industries of the State.

SECT. 3. The governor shall, immediately after the passage of this act, appoint, by and with the advice and consent of the Senate, some suitable person, who is identified with the labor interests of the State, who shall be designated Commissioner of Labor Statistics, and shall have an office with the Secretary of the State Board of Agriculture, whose term of office shall be for two years and until his successor is appointed and qualified.

SECT. 4. The Commissioner herein named shall receive an annual salary of one thousand dollars, which shall be paid in quarterly instalments; and to aid in carrying out the provisions of this act, said Commissioner is hereby authorized to employ such assistants and incur such expense, not exceeding one thousand dollars, as shall be necessary to carry out the provisions of this act, which shall be paid on proper vouchers presented by the Commissioner; and he shall, in the discharge of his duties, twice at least in each year, visit and inspect the principal factories, workshops and mines situate within the State, and a true report make of their condition.

SECT. 5. The Commissioner shall have power to take and preserve testimony, examine witnesses under oath, and administer the same; and in the discharge of his duties may, under proper restriction, enter any public institution of the State, and any factory, workshop or mine. The Commissioner may also furnish and deliver a written or printed list of interrogatories to any person, company, or the proper officer of any corporation, and require full and complete answers to be made thereto, and returned under oath; and if any person who may be sworn to give testimony shall wilfully fail or refuse to answer any question propounded to him concerning the subject of such examination, as provided in this act, or if any person to whom a written or printed list of interrogatories has been furnished by said Commissioner shall neglect or refuse to fully

answer and return the same under oath, such person shall be deemed guilty of a misdemeanor, and upon conviction thereof before a court of competent jurisdiction, shall be fined in a sum not exceeding fifty dollars, or by imprisonment in the county jail not exceeding ninety days, or by both such fine and imprisonment.

SECT. 6. All State, county, township and city officers are hereby directed to furnish to said Commissioner, upon his request, all statistical information in reference to labor which shall be in their possession as such officers.

SECT. 7. This act shall take effect and be in force from and after its publication in the official State paper.

Approved March 5, 1885.