greater the dilution of a secretion, and a positive result from this test, the stronger it is. The above-mentioned writers have further decided that "a secretion which will not coagulate milk, after a 1-25 dilution, indicates a condition of advanced atrophy, in which there is but little probability that the gastric secretion can be restored." Usually the free HCl returns, if at all, within a few weeks.

One of the objects of treatment is to restore the secretion as nearly as possible to its normal strength, consequently so long as examinations from time to time show an increase in the amount of HCl, treatment should be continued. I have found, however, that after the free HCl has reached the strength of about 0.5 of 1 part per 1,000, or .05 of 1 per cent., continued treatment fails to effect a further increase. I have never seen or heard this point discussed, therefore I do not know if mine has been a common experience with others.

TREATMENT.

The object of treatment is to overcome the inflammation and if possible to restore the secretion and the impaired motor power of the stomach. Since any single cause of the inflammation is rarely discoverable, we must remove all conditions which may be considered as contributing factors. Hence, good hygiene is advised, which means regular habits as to eating, exercise and action of the bowels, repair of carious teeth, etc.

Diet.—In this condition starches are better digested in the stomach than under normal conditions, while proteids are but poorly cared for here, being digested almost entirely in the intestines. Bearing this point in mind and remembering that all mechanical, chemical and thermal irritants are to be avoided, we have the key to dietetics in this disease.

The articles of food to be allowed I check from a printed diet list, usually advising three meals a day, with one or two lunches if desired. Of the more restricted diet in the beginning of treatment, patients will rarely eat too much, while if the scales show a maintenance or increase of weight, I feel that they are eating enough, regardless of the number of calories which the food represents. Cooked fats I have found are not usually well borne. No alcoholic liquors are allowed; my reasons for prohibiting them are given elsewhere.¹⁰

Mechanical Means.—To free the stomach of mucus and to stimulate secretion and peristalsis, douching of the stomach internally with a warm alkaline and saline solution, is, I believe, the most valuable means we possess. For this purpose I employ my stomach apparatus,¹¹ using the Rosenheim tube. The solution is injected with the amount of force desired, but it is always greater than that obtained by ordinary lavage. By the douche I believe that adherent mucus is more thoroughly removed than by simple lavage, while the stimulating action of the small forceful streams must be far greater than that produced by pouring water into a tube which has but one or two large eyes. In fact, I feel that douching of the stomach in gastritis and other conditions will become a more popular means of treatment when its technic and results are better known.

Riegel agrees that "the internal douche may frequently be employed with profit in chronic gastritis. It may be useful under certain conditions to force the fluid into the stomach under pressure." Douching or lavage should

be done at least twice a week and always with the fasting stomach. The agents which I usually employ are sodium chlorid and sodium bicarbonate 30 grains of each to a pint of water at 100 F. "Washing out" the stomach with copious draughts of medicated water seems but a poor substitute for douching.

Drugs.—For the purpose of dissolving mucus and increasing the secretion I use from 10 to 15 grains each of sodium chlorid and sodium bicarbonate in a glass of warm water, to be taken about fifteen minutes before meals. Some of the saline mineral waters may serve the same purpose in a measure, so also may some of the more elegant preparations containing the various salts. The phosphate or sulphate of sodium may be used, especially if there is constipation; nux vomica, condurango and other bitter tonics may be of service, but of late I have rarely used them.

I have elsewhere expressed my views regarding the use of hydrochloric acid¹² and pepsin.¹³ I believe that the large doses of from 15 to 20 minims of HCl fail to accomplish the desired object; moreover, I feel that they may do harm. Small doses of from 5 to 10 minims may in some ways prove beneficial, but I consider that there is no evidence to show that they stimulate the secretion of HCl.

Vacations and out-of-door exercise or occupation are important and at times seemingly necessary factors in the cure of gastritis.

419 Boylston Street.

A GRAPHIC METHOD IN PRACTICAL DIETETICS.

IRVING FISHER, Ph.D.

Professor of Political Economy, Yale University, and Secretary of the New Haven County Anti-Tuberculosis Association.
NEW HAVEN, CONN.

Professor Mendel, in an address on dietetics before an audience of Boston physicians, asked the very pertinent question: "Why do physicians take so much care in measuring their dosages of drugs, which are administered only occasionally, and so little care in measuring their food prescriptions, which are to be followed daily?" In prescribing drugs, a physician would be regarded as criminally negligent if he simply told his patients to take "a little" strychnia, but to be sure "not to take too much;" or to take a "big dose" of calomel. Yet in prescribing diet, physicians often give just such advice.

Doubtless in the scheme of Nature man was not expected to measure his food. He was provided with healthy, normal instincts instead. But, as often happens in diseased conditions, the food instinct has sometimes become perverted and can not be trusted. The consumptive requires, or at any rate is believed by most physicians to require, more food than his appetite calls for, and the victim of kidney diseases less. To re-establish the instinctive guides to food selection should doubtless be the ultimate aim of the physician; but, to that end, a quantitative determination of the food actually used, and a quantitative regulation thereof, may be advantageously employed. As yet, however, neither the quantity of food nor the proportions of its constituents have been often prescribed with precision.

12. Clinical and Laboratory Study of the Therapeutic Value of HCl in Diseases of the Stomach. Boston Med. and Surg. Jour., Sept. 14, 1905.

13. Therapeutic Value of Some Digestive Preparations. Boston Med. and Surg. Jour., May 18, 1905.

10. Philadelphia Med. Jour., June 6, 1903.

11. An Improved Stomach Tube, THE JOUR. A. M. A., July 28, 1906.

What Dr. Burton-Fanning says of prescribing food for the consumptive applies to food prescriptions in general, that the whole art of such prescriptions is summed up in the word accuracy.¹ Until recently accuracy was impossible. But to-day, by the aid of elaborate tables of food values constructed by Atwater and Bryant in America, and of mineral salts by Koenig in Germany, and, if great accuracy is required, of coefficients of digestibility, it has become possible to make a true measurement of diet prescriptions.

As to mineral salts, we know at least in which foods they are severally to be found. For instance, if a patient needs iron, he may, instead of taking the preparations of the druggist, have added to his list of foods one or more of the following: lentils, asparagus, lettuce, peas, figs, strawberries, spinach, beans, potatoes, prunes or apples, the order of which is that of the amount of iron contained in proportion to total food value.

Again, if calcium is needed, instead of limewater there may be administered milk, figs, cabbage or lentils. If sulphur is needed, the patient may be given potatoes, peas, beans, asparagus or cabbage; if phosphorus, beans, peas, rice, milk; if silicon, lettuce, cabbage, strawberries, rice, potatoes, barley or cucumbers; if magnesium, peas, beans, cocoanuts, barley and rice; if chlorin, cocoanuts, milk, lentils, asparagus, cabbage; if sodium, lentils, figs, asparagus; if potassium, beans, lentils, peas, cocoanuts, potatoes. Or if simply mineral salts in general are required, they are found in large quantities in proportion to food value, among lentils, peas, beans, cocoanuts, potatoes, milk, rice, figs, apples, barley, cabbage and chestnuts.

There are data also which describe the amount and kinds of acids in foods, their peptogenic qualities, their effects on peristalsis, etc.

THE BASIS OF COMPUTATION.

But the ordinary problems of dietetics are concerned not so much with these minor constituents and properties of foods as with the amount and proportions of proteids, fats and carbohydrates.

Two methods have hitherto been used for computing proportions of proteids, fats and carbohydrates. One consists in using the tables of percentages by weight of proteids, fats and carbohydrates; the other, Dr. J. H. Kellogg's, in using a table which gives the number of calories in the form of proteids, fats and carbohydrates per ounce of each kind of food. These may be described, respectively, as the method of weight per cent. and the method of calories per ounce. The method here suggested is different from either, and may be called the method of calories per cent. It takes as its starting point not a unit of weight, but a unit of food value, called a "standard portion" of each kind of food. A "standard portion" is defined as that amount of food which contains 100 calories. A table is constructed which gives the weight in a "standard portion" of each particular kind of food, and out of the 100 calories contained therein the number of calories in the form of proteids, fats and carbohydrates. The three methods were discussed and the last named explained in detail in another paper.² We shall, therefore, pass over this part of

our subject very briefly in the present paper and devote our main attention to the practical application.

In order to carry out this method, foods should be served at the table in "standard portions" or simple multiples thereof. The amount of milk served, instead of being a whole number of ounces, should be (for average milk) 4.9 ounces—the amount that contains 100 calories. This "standard portion" constitutes about two-thirds of an ordinary glass of milk. Of the 100 calories which it contains, 19 will be in the form of proteid, 52 in fat, and 29 in carbohydrates. In other words, of the food value of milk, 19 per cent. is proteid, 52 per cent. fat, and 29 per cent. carbohydrates.

One advantage of this method is apparent at once. It enables us to make a true comparison between different foods as to the relative amounts of proteid, fat and carbohydrate. The other methods are misleading in this regard. For instance, though it is well recognized that milk is a higher proteid food than pecan nuts, yet if we compare milk and pecans on the basis of the method of "weight per cent.," we shall find that the pecans appear three times as rich in proteid, milk containing 3.3 per cent. and pecans 11 per cent. But if we compare them on the basis of "calories per cent.," we find that, while milk contains 19 calories of proteid out of each 100 of total calories, pecans contain only 6, milk showing three times as much proteid as pecans. The paradox that pecans are higher in proteid per ounce but lower in proteid per 100 calories is due to the fact that pecans are a much more concentrated food than milk; whereas 100 calories of milk weigh 4.9 ounces, 100 calories of pecans weigh only half an ounce. The weight of a "standard portion" of any food, i. e., of that amount which contains 100 calories, is a measure of the degree of concentration. The most concentrated of all foods is probably olive oil, which contains 100 calories in a little over one-third of an ounce (.38 oz.). Watermelon represents a food at the opposite extreme, of which over 1½ pounds are required to yield the 100 calories. In order that the "calories per cent." method may be easily put in practice, it is necessary to have a table giving the weight constituting a "standard portion" (i. e., the amount yielding 100 calories) and the calories of proteid, fat and carbohydrate in this portion. At the close of the present article such a table is given, computed chiefly from the tables of Atwater and Bryant and, for made dishes, from those of Dr. Kellogg. The chief advantage of this method of expressing food values is that it lends itself readily to graphic representation. The difficulty in the practical use of most tables of food values is that they can not be visualized.

THE GRAPHIC METHOD.

Different foods contain the three food elements, proteids, fats and carbohydrates, in different proportions. The tripartite constitution of any particular food is represented in the present method by the position of a point in the triangle³ CPF (Fig. 1). The method of locating the point on the triangle is analogous to that of locating a city on a map by latitude and longitude; the per cent. of proteid⁴ in the food is represented, like latitude, by the height of the point above the base line CF (the total height, CP, being taken as 100 per cent.) The percentage of fat is represented, like longitude, by the distance

1. For a statement of the great divergences of sanatoria from this ideal, see "Statistics of Diet in Consumptive Sanatoria," Fisher, *Tran. Second Annual Meeting, Nat. Assoc. for Study and Prevention of Tuberculosis*, New York, 1907; also in *Am. Jour. of the Med. Sci.*, October, 1906.

2. Fisher: "A New Method for Indicating Food Values." *Amer. Jour. of Physiol.*, April 1, 1906.

3. For convenience, the triangle is drawn with one angle, C, a right angle and the two sides about it equal.

4. I employ the term proteid, although in the tables the figures represent "protein" (i. e., 6¼ times nitrogen), the usual makeshift for proteid.

C; nuts, with the exception of chestnuts, are located near the fat corner, F; fruits, with the exception of olives, near the carbohydrate corner, C; vegetables show a large range within the triangle. In Figure 8 the range of each of these classes is approximately shown.

The foods eaten at a meal may thus be indicated by points on the "food map." Opposite each point should be written the amount eaten, measured in "standard portions." This array of points presents a picture of what foods and how much of each have been eaten, and shows at a glance their characteristics. But to use this properly we need to combine these points into one point,

Figure 3.

Figure 4.

their center of gravity, which represents the entire meal. This may be done in various ways.

DEMONSTRATING COMBINATIONS.

The combination of two foods equal in calories is represented by a point midway between them. Thus, to combine one "portion" of bread and one "portion" of butter (Fig. 9) draw a straight line between their points, and at the middle of it mark a cross and label it "2;" this point will represent two "portions" of bread and butter.

If the calories of the two foods are unequal, the point representing the combination will be proportionately nearer the point with the larger number. Thus, if one portion of bread is combined with one-half portion of butter, the bread-and-butter point will not be midway between the points for bread and for butter, but will lie twice as near the bread point as the butter point. Its approximate position may be found with great rapidity by the eye without making exact measurements.

When three foods are combined, the point representing the combination is, in like manner, the "center of gravity" of the three, and may be found by first obtain-

Figure 5.

Figure 6.

ing the center of gravity of two, and then obtaining the center of gravity of the point thus obtained, and the third. Thus if, as in Figure 10, we have three points representing, respectively, 3, 4, and 5 calories of three separate foods, shown by the attached numbers 3, 4 and 5, the point representing the combination may be found by joining the points labelled 3 and 4, and finding their center of gravity, 7, situated nearer the point 4 than point 3, and dividing the line between them in the ratio of 3 to 4. The first two points, 3 and 4, may be consid-

TABLE OF FOODS GIVING THE WEIGHT (IN GRAMS, OUNCES AND ROUGH MEASURE) OF A "STANDARD PORTION" OF EACH FOOD AND THE NUMBER OF CALORIES IN THAT "PORTION" IN THE FORM OF PROTEID, FAT AND CARBOHYDRATE.

Name of Food.	Wt. of 100 Calories.		Per cent. of		"Portion" Containing 100 Calories Roughly Described.	Name of Food.	Wt. of 100 Calories.		Per cent. of		"Portion" Containing 100 Calories Roughly Described.
	Grams.	Oz.	Proteid.	Fat.			Carbhydrate.	Grams.	Oz.	Proteid.	
COOKED MEATS.											
*Beef, round, boiled (fat), 1099g.	36	1.3	40	60	00	*Apples, as purchased	206	7.3	3	7	96
*Beef, round, boiled (lean), 1206g.	62	2.2	50	10	00	Apples, baked	94	3.3	5	83	93
*Beef, round, boiled (med.), 1188g.	44	1.6	60	40	00	Ordinary serving	111	3.9	2	5	92
*Beef, 5th right rib, roasted, 1538g.	18.5	1.65	12	88	00	*Apricots, edible portion, average	108	5.92	8	0	92
*Beef, 5th right rib, roasted, 1616g.	32	1.2	25	75	00	Apricots, cooked	131	4.61	6	0	90
*Beef, 5th right rib, roasted, 1615g.	25	1.2	25	75	00	*Bananas, yellow, edible portion, average	100	3.5	5	5	90
*Beef, 5th right rib, roasted, 1615g.	30	1.1	27	73	00	Blackberries, as purchased, average	170	5.9	16	75	89
*Beef, ribs boiled, 1169g.	25	1.1	27	73	00	Blueberries	128	4.6	3	8	89
*Beef, ribs boiled, 1170g.	35	1.2	27	73	00	*Blueberries, canned, as purchased	105	5.8	4	9	87
*Calves foot jelly, as purchased	112	4	19	00	81	Cantaloupe	243	8.6	6	0	94
*Chicken, as purchased, canned	27	1.1	23	77	00	*Cherries, edible portion, average	124	4.4	5	10	85
*Lamb chops, boiled, edible portion, average	27	1.1	23	77	00	*Cherries, as purchased, average	210	7.5	3	12	85
*Lamb, leg, roast.	50	1.8	40	60	00	*Grapes, as purchased, average	136	4.8	5	15	80
*Mutton, leg, boiled, 1184g.	34	1.2	35	65	00	Grape fruit	215	7.57	7	4	89
*Pork, ham, boiled (fat), 1174g.	20.5	1.73	14	86	00	Grape juice	120	4.2	0	0	100
*Pork, ham, boiled (lean), 1192g.	32.5	1.1	28	72	00	Gooseberries	201	9.2	5	0	95
*Pork, ham, roasted (fat), 1484g.	27	1.1	23	77	00	Lemons	215	7.57	9	14	77
*Pork, ham, roasted (lean), 1511g.	34	1.2	35	65	00	Lemon juice	246	8.77	0	0	100
*Turkey, as purchased, canned	28	1.1	23	77	00	Nectarines	147	5.18	4	0	96
*Veal, leg, boiled, 1182g.	67.5	2.4	73	27	00	Olives, ripe	37	1.31	2	91	7
UNCOOKED MEATS.											
*Beef, loin, edible portion, average (lean).	50	1.8	40	60	00	*Oranges, as purchased, average	270	9.4	6	3	91
*Beef, loin, edible portion, average (fat).	30	1.1	23	77	00	Oranges, juice	188	6.62	0	0	100
*Beef, loin, porterhouse steak, edible por., av.	36	1.3	32	68	00	*Peaches, as purchased, average	290	10	7	2	94
*Beef, loin, sirloin steak, edible portion, av.	40	1.4	31	69	00	Peaches, sauce	196	4.78	4	2	94
*Beef, ribs, lean, edible portion, average.	52	1.8	42	58	00	*Pears, juice	136	4.80	0	0	100
*Beef, round, lean, edible portion, average.	63	2.2	47	53	00	Pears, sauce	173	5.49	4	7	83
*Beef, tongue, edible portion, average.	305	10.7	78	22	00	*Pineapples, edible portion, average	133	3.98	3	4	83
*Beef, juice	60	2.1	79	21	00	Raspberries, black	226	8	4	6	90
*Chicken (broilers), edible portion, average.	210	7.4	56	8	36	Raspberries, red	146	5.18	10	14	76
*Clams, round, in shell, edible portion, average.	138	4.9	53	5	00	*Strawberries, as purchased, average	178	6.29	8	0	92
*Cod, whole, edible portion	81	2.8	61	39	00	Watermelon, as purchased, average	260	9.1	10	15	75
*Goose (young), edible portion, average.	117	4.1	78	20	2		700	27	6	6	88
*Halibut steaks or sec., edible portion, average.	57	2	50	50	00	CAKES, PASTRY, PUDDING AND DESSERTS.					
*Liver (veal), as purchased, average.	50	1.8	41	59	00	*Cake, chocolate layer, as purchased	28	.98	7	22	71
*Lobsters, whole, edible portion, average.	193	6.8	49	22	25	*Cake, gingerbread, as purchased	27	.96	6	23	68
*Mackerel (Spanish), whole, edible portion, av.	27	1.1	23	77	00	Custard, caramel	25	.89	7	25	71
*Mutton leg, hind, lean, edible portion, average.	36	1.3	29	71	00	Custard, milk	71	2.51	19	10	71
*Oysters, in shell, edible portion, average.	57	2	50	50	00	Custard, custard	122	4.29	26	56	18
*Pork, loin chops, edible portion, average.	42	1.5	36	64	00	Custard, custard	69.5	2.45	9	12	79
*Pork, ham, smoked, lean, edible portion, av.	69	2.4	46	54	00	Two-thirds ordinary	23	.85	6	45	40
*Pork, bacon, smoked, med. fat, edible por., av.	100	3.6	80	20	00	Half a doughnut	27	.95	10	19	78
*Salmon (California), ant. sec., ed. por., av.	33	1.2	29	71	00	Doughnuts, as purchased	23	.82	6	33	61
*Shad, whole, edible portion, average.	100	3.6	80	20	00	*Lady fingers, as purchased	38	1.8	5	32	63
*Trout, brook, whole, edible portion, average.	100	3.6	80	20	00	Macarons, as purchased	30	1.1	5	32	63
*Turkey, edible portion, average.	33	1.2	29	71	00	*Pie, cream, as purchased	55	1.9	6	32	59
VEGETABLES.											
*Artichokes, as purchased, average, canned	430	15	14	0	86	*Pie, custard, as purchased	28	1.35	6	36	54
*Asparagus, as purchased, average, canned	540	19	33	5	02	*Pie, lemon, as purchased	25	1.2	8	38	54
*Asparagus, as purchased, average, cooked	246	7.10	18	03	19	*Pie, mince, as purchased	25	1.9	10	42	48
*Beans, baked, canned	126	4.44	21	4	73	*Pie, squash, as purchased	81	3.02	6	3	91
*Beans, Lima, canned	480	16.66	15	48	37	Pudding, apple sagu	56.6	2	7	12	81
*Beans, string, cooked	480	16.66	15	48	37	Pudding, brown berry	75	2.65	8	13	79
						Pudding, cream rice	56.6	2	7	12	81
						Pudding, Indian meal	56.6	2	7	12	81
						Pudding, apple tapioca	70	2.8	12	25	63
						Tapioca, cooked	108	3.85	1	1	98

SWEETS AND PICKLES

*Fatsup, tomato, as purchased, average.....	170	6.	10	3	87
*Honey, as purchased.....	30	1.05	1	0	99
*Marmalade (orange peel).....	28.3	1.	.5	2.5	97
*Molasses, cane.....	35	1.2	1	0	99.5
*Olives, green, edible portion.....	32	1.1	1	84	15
*Olives, ripe, edible portion.....	38	1.3	2	91	7
*Pickles, mixed, as purchased.....	415	14.6	18	15	67
*Sugar, granulated.....	24	.86	0	0	100
*Sugar, maple.....	29	1.03	0	0	100
*Syrup, maple.....	35	1.2	0	0	100

NUTS.

*Almonds, edible portion, average.....	15	53	13	77	10
*Beechnuts.....	14	52	13	79	8
*Brazil nuts, edible portion.....	14	50	16	86	4
*Butternuts.....	16	57	4	77	10
*Cocoanuts.....	40	14	10	20	70
*Chestnuts, fresh, edible portion, average.....	14	48	9	84	6
*Filberts, edible portion, average.....	13	47	9	83	7
*Hickory nuts.....	18	46	20	63	17
*Peanuts, edible portion, average.....	13	46	6	87	4
*Pecans, polished, edible portion.....	16	56	22	74	7
*Pine nuts (pignolias), edible portion.....	14	48	10	83	7
*Walnuts, California, edible portion.....	14	48	10	83	7

CEREALS.

*Bread, brown, as purchased, average.....	43	1.5	9	7	84
*Bread, corn (johnnycake) as purchased, av.....	38	1.3	12	16	72
*Bread, white, home made, as purchased.....	38	1.3	13	6	81
*Ordinary thick slice.....	27	.97	11	1	88
*Ord. cereal dish full.....	27	.96	10	11	85
*Corn meal, granular, average.....	26	.92	9	15	80
*Crackers, graham, as purchased.....	23	.82	9	20	71
*Crackers, oatmeal, as purchased.....	23	.81	11	24	65
*Flour, cooked.....	120	4.2	11	2	87
*Macaroni, average.....	27	.96	15	2	83
*Macaroni, average, cooked.....	110	3.85	14	15	71
*Oatmeal, average, boiled.....	159	5.6	18	7	75
*Popcorn, average.....	24	.86	11	11	78
*Rice, uncooked.....	28	.98	10	1	90
*Rice, boiled, average.....	27	.94	10	1	89
*Rice, flakes.....	35	1.2	18	1	91
*Rolls, Vienna, as purchased, average.....	27	.94	12	7	81
*Shredded wheat.....	28	.97	13	4.5	82.5
*Spaghetti, average.....	27	.96	15	5	80
*Wheat flour, entire wheat, average.....	27	.96	15	5	80
*Wheat flour, graham, average.....	27	.96	15	5	80
*Wheat flour, patent roller process, family and straight grade spring wheat, average.....	27	.97	12	3	85
*Zweiback.....	23	.81	9	21	70

MISCELLANEOUS.

*Eggs, hen's, boiled.....	59	2.1	32	68	00
*Eggs, hen's, whites.....	181	6.4	100	0	00
*Eggs, hen's, yolks.....	27	.94	17	83	00
*Onionet.....	94	3.3	34	60	6
*Soup, beef, as purchased, average.....	380	13	69	14	17
*Soup, bean, as purchased, average.....	150	5.4	20	20	60
*Soup, cream of celery, as purchased, average.....	180	6.3	16	47	37
*Consomme, as purchased.....	180	6.3	16	47	37
*Clam chowder, as purchased.....	230	8.25	17	18	65

*Beets, edible portion, cooked.....	245	8.7	2	23	75
*Cabbage, edible portion.....	210	11	10	8	82
*Carrots, edible portion, average, fresh.....	215	7.6	10	34	56
*Carrots, cooked.....	164	5.81	23	15	62
*Cauliflower, as purchased, average.....	312	11	23	15	71
*Celery, edible portion, average.....	540	13	13	10	77
*Corn, sweet, cooked.....	99	3.5	27	1	72
*Cucumbers, edible portion, average.....	565	20	17	10	73
*Egg plant, edible portion, average.....	360	12	17	10	73
*Lentils, cooked.....	89	3.15	27	1	72
*Lettuce, edible portion, average.....	505	18	25	14	61
*Mushrooms, as purchased, average.....	215	7.6	31	8	61
*Onions, fresh, edible portion, average.....	200	7.1	13	5	82
*Onions, cooked.....	240	8.4	12	40	48
*Parsnips, edible portion, average.....	152	5.3	10	7	83
*Parsnips, cooked.....	163	5.84	10	34	56
*Peas, green, canned.....	178	6.3	25	3	72
*Peas, green, cooked.....	85	3	23	27	50
*Potatoes, baked.....	86	3.05	11	1	88
*Potatoes, boiled.....	102	3.62	11	1	88
*Potatoes, mashed (cream).....	89	3.14	10	25	63
*Potatoes, steamed.....	101	3.57	11	1	88
*Potatoes, chips.....	17	6	4	63	33
*Potatoes, sweet, cooked.....	49	1.7	6	9	85
*Pumpkins, as purchased.....	380	13	15	4	81
*Radishes, as purchased.....	480	17	18	3	79
*Rhubarb, edible portion, average.....	430	15	10	27	63
*Spinach, cooked, as purchased.....	210	9.1	15	66	19
*Squash, edible portion, average.....	174	7.4	12	10	78
*Succotash, canned, as purchased.....	100	3.5	15	9	76
*Tomatoes, fresh, as purchased, average.....	430	13	15	16	69
*Tomatoes, canned.....	431	15.2	21	7	72
*Turnips, edible portion, average.....	246	8.7	13	51	83
*Vegetable oysters.....	273	9.62	10	51	83

DAIRY PRODUCTS.

*Butter, as purchased.....	12.5	.44	51	99.5	00
*Buttermilk, as purchased.....	275	9.7	34	12	54
*Cheese, American, pale, as purchased.....	89	2.7	25	73	2
*Cheese, cottage, as purchased.....	22	3.12	76	8	16
*Cheese, full cream, as purchased.....	29.5	8.2	25	73	2
*Cheese, Swiss, as purchased.....	23	1.05	22	76	2
*Cheese, Neuchâtel, as purchased.....	23	8	25	73	2
*Cream, sweet, as purchased.....	20	7.2	25	74	1
*Cream, plain, as purchased.....	49	1.7	5	86	9
*Kumyss.....	188	6.7	21	37	42
*Milk, condensed, sweetened, as purchased.....	30	1.06	10	23	67
*Milk, condensed, unsweetened (evap. cream) as purchased.....	59	2.05	24	50	26
*Milk, skimmed.....	255	9.4	37	7	56
*Milk, whole, as purchased.....	140	4.9	19	52	29
*Whey, as purchased.....	360	13	15	10	75

FRUITS (DRIED).

*Apples, as purchased, average.....	34	1.2	3	7	90
*Apricots, as purchased, average.....	35	1.24	7	3	90
*Dates, edible portion, average.....	28	.90	2	7	91
*Dates, as purchased.....	31	1.1	5	0	95
*Figs, edible portion, average.....	32	1.14	3	0	87
*Prunes, edible portion, average.....	38	1.35	3	0	97
*Raisins, as purchased.....	28	1.1	3	9	88
*Raisins, as purchased.....	31	1.1	3	9	88

† Experiments on Losses in Cooking Meats. (1900-03), Grindley, U. S. Department of Agriculture Bull. No. 141.

§ Laboratory number of specimen, as per Experiments on Losses in Cooking Meat.

* Chemical Composition of American Food Materials, Atwater and Bryant, U. S. Department of Agriculture, Bull. No. 28.

ered as concentrated at 7 with their combined weight, 7. We then find the center of gravity of this new point 7 and the remaining point, 5. The center of gravity of this point 7 and point 5 will be a point, 12, on the straight line between them, situated nearer the 7 than the 5, and dividing the distance between in the ratio of 5 to 7. At point 12 the whole combination of 12 portions may be considered to be concentrated. It is evident that we could find the center of gravity of the same three points by combining them in a different order, but the result would be the same.

It is also evident that more than three points may be combined on the same principles by combining them by twos and threes and then combining the combinations.

Figure 7.

Figure 9.

Figure 10.

Figure 11.

proteid requirements, a well-balanced daily ration for the average person will be represented by a point lying within the "normal rectangle," as shown in Figure 11. This shows that proteid should be near 10 per cent.

All foods may be classified according to their location relatively to this rectangle. Thus, all foods located above the rectangle are high-proteid foods; all below, low-proteid foods; all within, normal-proteid foods. Looking at the "food map" we see among the high-proteid foods, beginning with the lowest, graham bread, macaroni, tomatoes, whole-wheat bread, pine nuts, beans, buttermilk, cheese and meats. Among the low-proteid foods, beginning with the highest, are most fruits (except raspberries and strawberries), cream, pecans, olives, butter, olive oil, sugar. Among the foods normal in proteid are most breads, wheat flakes, corn flakes, strawberries, raspberries, chestnuts and most other nuts (except pine nuts and pecans). In the same way we may classify foods as to their richness in fat or carbohydrate; but there is a larger range allowable for these elements than for proteid. High proteid foods tend to make the

When all the points are combined into one point, that point will represent the entire meal. If the final point thus found is labeled "22," and is located 20 per cent. up and 30 per cent. to the right, this shows that in all twenty-two "portions" (2,200 calories) have been consumed, of which 20 per cent. (440 calories) are proteid, 30 per cent. (660 calories) are fat, and the balance, 50 per cent. (1,100 calories), are carbohydrate.

The ration here exemplified contains too much proteid. If we accept Professor Chittenden's⁷ results as to

ration high in proteid, and will do so unless balanced by low-proteid foods. Most persons consume much more proteid than that in the Chittenden standard. This excess may be avoided either by omitting foods high in proteid or by using them very sparingly.

Since the resultant point, representing the ration, is the center of gravity of the points representing its constituents, it is evident that it can be obtained by mechanical as well as by geometrical methods. For this purpose a mechanical diet indicator has been devised, as shown in Figures 12, 13, 14, 15.

The essential feature of this apparatus is a card on

⁷ See his "Physiological Economy in Nutrition," New York (Stokes), 1904.

which is drawn the right-angled triangle with which we have already become familiar. Points on this card may be located to represent the various foods employed. These points may be easily found from tables given at the end of this article. Points representing the most common foods may be already printed on it. At points representing foods eaten, pins with heavy heads are thrust through the cardboard (Fig. 12), the weight of each representing one "standard portion." Similar pins, but one-half and one-quarter as heavy, are also provided to

almost instantaneously, the center of gravity is found. The total time consumed in placing the pins, adjusting the card and basket, and finding the center of gravity, is found to be, for accurate work, about five minutes.⁸

The mechanism in which the cardboard triangle is held is so arranged that when the cardboard is horizontal the center of gravity falls at a point indicating normal food proportions. If the center of gravity is at some other point, the cardboard will tip, showing that the ration is not "balanced." If the proteid vertex tips

Figure 12.

Figure 14.

Figure 15.

represent half and quarter "portions." When these pins are placed, the total ration which has been consumed is easily found, simply by counting the "portions" thus represented. For instance, if there are 15 pins representing "standard portions" and 10 pins representing half "portions" (and therefore five full "portions"), the total ration is 20 "portions," or 2,000 calories. In order to find the percentages of proteid, fat and carbohydrate

down, it indicates an excess of proteid; if the fat vertex, excess of fat; if the carbohydrate vertex, excess of carbohydrate.

It is now evident that, by means of the mechanism and the rectangles marked on the card, it is a simple matter to discover whether a particular diet conforms to any given standard. It is equally simple to correct discrepancies thus found, and, if need be, the corrections may be made in advance and the balanced ration prescribed. A trial ration may be put on the card, and if it fails to balance, the pins may be rearranged and balanced with far greater rapidity than the corresponding operations could be carried out by arithmetical computations.

One advantage, however, of the foregoing methods is that, whether the object is merely to record what is consumed or actually to prescribe, the patient need not be annoyed by having scales at table. All weighing may be done in the kitchen and the food served in "standard portions" or in known multiples or fractions of such portions. It is only necessary that the patient, or some one else, shall report exactly what part of the various portions served has been consumed. The patient need not even know the food values of the portions served to him, and thus the introspection and trepidation, which often defeat the very aim of diet prescription for

Figure 13.

in this ration, it is only necessary to obtain the center of gravity of all the pins. For this purpose the card is placed in a basket (Fig. 13) and suspended on a stand-ard (Fig. 14) so that the center of gravity of the pins may assume a position vertically under the point of support. The position of this center of gravity is easily indicated on the card by means of a vertical pricker (Fig. 15), which may be pressed on the card. Thus,

8. The weight of the cardboard and the basket containing it is eliminated by the construction of the basket. Its center of gravity (when containing the cardboard *without* pins) exactly coincides with the point of support. Hence, when the basket with the card (but *without* pins) is placed on the point of support, it tends neither to swing (which would imply stable equilibrium) nor to be top-heavy (which would imply unstable equilibrium), but is in "neutral" equilibrium, and will remain at any angle at which it is placed.

the sick, may be avoided. For well persons who desire to keep a record of their dietary, the method here given has the advantage that when it is once made familiar it can be employed without any apparatus. One soon becomes able to recognize the quantities of the ordinary foods which contain 100 calories, and to hold in memory the position on the triangle where these foods are indicated. A little reflection will then enable him to judge how many "standard portions" he has consumed at a meal, and also whether their center of gravity falls within the normal rectangle. If he has a good locative imagination, he can rely entirely on his mental image of the triangle. Any one who has once pictured the foods on the "food map" is not likely to forget their several locations. He will know that a meal in which soup, fish, meat, certain high-proteid vegetables, eggs, cheese, milk and ice cream predominate, must be too high in proteid; for all these foods are located above the "normal rectangle." Moreover, he will be able, after a little practice, to estimate roughly the calorific value of his food. A "portion" of 100 calories may be ascribed to each lamb chop, or its equivalent in other meat, each (large) egg, each two-thirds of a glass of milk, each ordinary potato, large slice of bread, large banana, ordinary pat or square of butter, shredded wheat biscuit or its equivalent in other cereal, eight almonds, half dozen English walnuts, one and one-half lumps of sugar, etc.

To illustrate the method by practical examples, let us suppose that for a particular patient the prescription is for 2,000 calories a day, of foods so combined that the food proportions will be represented by a point within the right half of the rectangle. To carry out this prescription the patient looks at the "food map" and finds no foods on it which themselves fall within the prescribed area. He observes, however, that bread and butter are located on opposite sides of this area, and his eye shows him that a combination of the two in equal parts (by calories, not by weight) will very nearly fall within it, though slightly too low. Corn flakes and cream combine within the set limits; milk and dates (a favorite oriental combination) fall near the mark; poached eggs on toast (with the whites left out) will also come near the proper spot, though slightly too high; any cereal foods or fruits (which lie at the left), combined with foods which lie at the right, as egg yolk, nuts or cream, butter, olives or olive oil will combine nearly right, provided the right-hand foods predominate. Choosing such of these combinations as are most relished, the patient eats his meal. Afterward he, his physician or nurse indicates on the triangle by pencil marks each food which has been eaten, or, if he has a mechanical diet indicator, by the weighted pins. The center of gravity will then show exactly where his meal is located on the "food map," and the total number of "portions" will show how much he has eaten. The cause of any deviation from the prescription will be very apparent. It may be that the point is too high, indicating excessive proteid, and this may be due to too much milk, eggs or meat; or too much cereal food may have displaced the point to the left. These errors may be rectified at the next meal. At the end of the day, from the cards used in the three meals, he selects the three centers of gravity and transfers them to a fourth card, from which, in the same way, the total calories and center of gravity for the three are found; this represents the total day's ration.

Or, again, a patient may at first be given *carte blanche* in his food, merely reporting the "portions" eaten. Each dish being served in "portions," this will require little

trouble. In fact, a nurse may do it all by noting what is put on a tray and what is left after the meal. On the basis of the returns, the physician or nurse can tell exactly how much and what proportions the patient is eating, and his besetting dietetic sins will be evident. The physician will be enabled thereby to guide him intelligently, suggesting, for instance, that he reduce his ration to two-thirds of what he has been accustomed to, or reduce meat, eggs, etc., or take more cream and butter, etc. It goes without saying that any change in diet, unless it be a change in amount only, should be gradual.⁹ Thus, if a person has been accustomed to excessive proteid, his stomach has probably become adjusted to this condition and secretes a large amount of gastric juice. When the reduction of proteid is sudden, the gastric juice will not at first decrease in proportion, and a large part of this secretion will therefore remain unused. This uncombined acid interferes with the digestion of starch and the person feels a "sour stomach." A gradual reduction of proteid, on the other hand, will avoid this difficulty. The reduction may be more rapid (for the hyperacid) if the proportion of fat is increased, as fat tends to restrain the gastric secretion.

In the winter of 1906 the mechanical diet indicator was employed for five months in an experiment with nine Yale students. No diet was prescribed, and the indicator was used only to record the diet which the men themselves chose. It was found that by following Mr. Fletcher's rules of thorough mastication and obedience to appetite, the men gradually and naturally reduced their proteid. The extraordinary effects on their working power are described elsewhere.¹⁰ To what extent such "natural eating" can help in pathologic cases has not yet been shown, although some physicians are reported to have found it a very valuable aid in their practice. Certainly it could scarcely fail to be more serviceable than the unintelligent and reckless diet prescriptions so often made.

Whether or not diet prescriptions are given, the actual diet employed by patients should receive study. This study is made easy by means of the graphic and mechanical methods.¹¹ These methods may be used with advantage in the kitchen by housewives desirous of supplying balanced meals, and may be of special service in institutions where it is important to provide complete and well-proportioned nourishment at a minimum of cost. On the mechanical diet indicator the weighted pins may be placed to indicate any proposed meal, and this meal, by a slight adjustment of the weights, may be balanced as exactly as desired.

The accompanying table of foods is classified under several heads:

Cooked meats.	Uncooked meats.
Vegetables.	Dairy products.
Fruits.	Nuts.
Sweets and pickles.	Cereals.
Cakes, pastry, puddings and desserts.	
Miscellaneous.	

APPENDIX.

The preceding table gives the data for the ordinary foods, in a form most readily used for the graphic or the mechanical

9. Hutchinson, Robert: General Considerations on the Therapeutic Uses of Diet. Practitioner, April 1906, p. 470.

10. For a short abstract see Science, Nov. 16, 1906. A full report will appear in the Transactions of the Connecticut Academy of Arts and Sciences.

11. There is no patent on this device; anyone is free to make and use it. The Battle Creek Sanitarium has had experience in constructing the apparatus. A regular instrument maker may take up its manufacture later if conditions warrant.

method. The figures for carbohydrate are included, although, as has been shown, they do not need to be used in practical application, the location of each food on the "food map" being completely determined by its "latitude" and "longitude," i. e., the proportion of the fuel value in proteid and fat respectively. The foods, so far as possible, are prepared foods such as are served on the table, but unfortunately, the main sources of information being *Bulletin No. 28* of the Department of Agriculture, for food materials, it has not been possible to include all prepared dishes desired. Moreover, recipes vary so that it would be impracticable to supply data for such dishes which could be used with advantage or certainty. It is easily possible, however, for any one who uses the table to add to it the necessary data for any made dish of known recipe. All that is necessary is to translate the weights of the various ingredients into a number of "standard portions," and then to locate these ingredients on the "food map" and find their center of gravity. This will indicate the position of the composite food. The weight of a "standard portion" of this food is found by dividing the aggregate weight of all the ingredients used by the number of "portions" in them, as above ascertained.

Thus, to locate sponge cake, when the recipe is 3 eggs, 1 "cup" (4 oz.) sugar, and 1 "cup" (4 oz.) flour; the eggs, if of ordinary size, weigh $4\frac{1}{4}$ oz. and constitute, as the table shows, 2 "portions;" the sugar, weighing 4 oz., constitutes 4.65 "portions" and the flour, weighing 4 oz., 4.2 "portions." This gives a total weight of $12\frac{1}{4}$ oz., and 11 as the total number of "portions." Dividing the former by the latter, we have 1.1 oz. as the weight of a "portion" of sponge cake. The position on the "food map" of sponge cake is now found by putting the pins at the points on the map as indicated by the table for sugar, eggs and flour. These weights, representing respectively 4.65, 2, and 4.2 "portions," the center of gravity shows the position of sponge cake, which is about 11 per cent. of proteid and about 12 per cent. of fat. This result does not agree exactly with sponge cake as given in the table, owing to the difference in recipe, that in the table probably including shortening.

Unless great precision is required, a sufficient approximation may be obtained in general by omitting fractional portions: thus, we may call the eggs 2 "portions," the sugar 5, and the flour 4. The resulting center of gravity may be found roughly by the eye, without even the aid of the diet indicator. It is surprising how close such a rough approximation will usually be found to the true value, as the influence of the errors in the particular ingredients, on the combined result, is small, and the various errors usually tend to offset each other.

Should the reader desire to add other items to the table, either of food materials or food stuffs, he may do so by using the sources from which the table is constructed. Thus, if he will obtain from the Department of Agriculture *Bulletin No. 28*, "Chemical Composition of American Food Materials," he may translate the figures there given into the form to be entered in the table as follows: The weight in ounces of a "standard portion" is found by dividing 1,600 by the number of calories per pound given in the table. The calories per cent. of proteid is found by multiplying the figure in the *Bulletin* table giving the weight per cent. of proteid, by 1860 and dividing the result by the figure giving the number of calories per pound. The same calculation and the same factor, 1860, apply to carbohydrate. For fat the same calculation applies, but with the substitution of the factor 4220 in place of 1860. The three results may be verified by adding the resulting figures for proteid, fat and carbohydrate, the sum of which should be 100 per cent. To weigh foods, letter scales will usually suffice, the food being weighed in dishes and the weight of the dishes subtracted.

Abuse of Medical Charity.—Is it presumption on our part to ask the trustees to protect the hospital physician from wasting his strength, time and skill, his capital in life, on those who have no right to them? And, furthermore, to ask them to show due consideration to the family physician by refusing to allow well-to-do people to obtain free treatment at the institutions under their charge?—G. W. Gay, Boston.

MYXEDEMA.

CAMPBELL P. HOWARD, M.D.

Outdoor Physician to the Montreal General Hospital.
MONTREAL, CANADA.

(Continued from page 1230.)

CASE 4.—White, female, aged 46; multipara; pronounced clinical picture; six years' duration; thyroid therapy; loss of $21\frac{1}{2}$ pounds in eight weeks; recovery.

Patient.—F. A., American; housewife; Nova Scotia, Canada, was admitted to the Johns Hopkins Hospital March 16, 1895, complaining of "swelling and apathy."

History.—Family and personal history were unimportant. Patient was married and the mother of several children. In her youth she had been a very beautiful woman, and always very active in family and social duties.

Present Illness.—This began insidiously about five or six years before admission, when the patient was about 40 years old, and progressed steadily until it resulted in almost complete physical and mental disability. The face became bloated, the eyeballs being especially full and baggy. Enormous pads developed above the clavicles. Her hands and feet gradually enlarged, and the skin everywhere was unusually harsh and dry. Her hair fell out and she became abnormally sensitive to cold. She was dull and apathetic, but hypersensitive on one point, her looks. She exhibited a dislike for society, and at one time refused to see even the members of her own family. Dr. Osler, who knew her in her youth, at his first visit "could scarcely believe that the bloated shapeless mass of humanity had twenty years ago been the belle of her town."

Physical Examination.—Examination on March 18, 1895, revealed a characteristic edematous facies; forehead was much swollen and infiltrated, but the wrinkles were not obliterated. Both eyelids were infiltrated and edematous, and there were bags of edema in the lower lids. The palpebral orifices were distinctly narrowed. The cheeks looked swollen, and the features were coarse. The movements of the facial and ocular muscles were good. Pupils were active; lips chapped. The tongue was clean, smooth and swollen. There was a distinct swelling above both clavicles and at the back of the neck. The hands were puffy and swollen (though this varied a good deal), and the skin was glazed and cracked.

The skin was universally dry and harsh. The teeth were loose, several were lost and the gums had receded. The hair, which was formerly very abundant, was very thin, and over the scalp there were several irregular bald patches. There was a marked depression, somewhat V-shaped, in the anterior triangle of the neck, and no thyroid gland could be felt. The intelligence was good. She was somewhat emotional, but had no delusions. Cerebration was slow.

The voice had become harsh and rough. The pulse was from 80 to 88 to the minute. The temperature was subnormal, 96.5 to 97.8 degrees. The weight was 158 pounds. The urine varied from 650 to 800 c.c. in twenty-four hours, specific gravity of 1008 to 1015, and contained a trace of albumin, but no casts.

Clinical History.—March 20, 1895: Thyroid extract, gr. iss, t.i.d.

March 22: There was sweating of the palms of hands and also burning pains in the limbs. She was very despondent.

March 28: The pulse gradually increased in rate, averaging 95 to minute. The puffiness of the face was greatly diminished and there was no longer edema about the lids. She was much brighter and showed an interest in her surroundings.

April 1: The temperature was often above normal and the pulse rarely below 100.

April 4: She had lost 12 pounds in two weeks and then weighed 146 pounds. The physical and mental improvement continued steadily.

May 11: She was discharged, having further improved and having lost in all $21\frac{1}{2}$ pounds in weight (136½ pounds) in the eight weeks following the administration of about 287 grains of thyroid extract. She was cheerful, the swelling and puffiness had all gone, and she was an entirely different woman. The amount of urine had increased after commencing the extract and often reached 1,000 to 1,300 c.c. Subsequent to her