tion will do so at once, that they may be sure of obtaining either of the journals referred to from the commencement of the year.

Selected Articles.

ON THE ECONOMIC VALUE OF FOOD.

(From a paper read before the Society of Arts, December, 1863, by Dr. Edward Smith, F.R.S., of the Brampton Hospital for Consumption.)

The amount of nutriment which can be obtained from any given food, depends upon the nutritive elements of which it is composed, and on the use which the body can make of them. Thus, the bark of trees and sawdust in chemical composition, contain much of the elements of nutrition, but as the stomach cannot digest much of them, they would not be an advantageous food at any price. It is at this point that deductions from chemical knowledge alone have led, and I must add, are still leading to error. Nearly all the generalisations of Liebig on the nutritive value of food, were based simply upon their chemical constituents, assuming in a general manner that they would all be equally well digested and appropriated by the system. That this too hasty generalisation should have been made many years ago, cannot be wondered at, seeing that both chemical and physiological knowledge was then most imperfect, and that the authorities were chemists only; but that men of repute should, even to the present week, publish knowledge of this kind, and even take credit for it, is much to be regretted. So strong a hold do the impressions of our earlier years take upon our minds, whether they have been derived from our own observation or from the books by which we were educated. It is still not at all generally apprehended, even by good chemists, that on questions of food we must ascertain in what degree the system can appropriate foods, before we can venture to affirm their relative nutritive qualities from their relative chemical composition. As I attach great significance to this fact, and shall have to apply it as we proceed, I am particularly desirous that it should not be forgotten. The question is not what nutritive elements food possesses, but how much nutritive matter the body can obtain from it. Hence, a food is economical as the body can obtain from it the largest amount of nutriment at the least cost. In proceeding to apply these general principles to the individual articles of food, I must select those elements essential to nutrition, and also name some price which shall be regarded as a standard of cost.

Nutritive Elements Selected,

As to the elements of food, I propose to select the carbon and nitrogen only, since they alone can be collected as they leave the body. If I were treating of the nutritive value of food in a chemical aspect only, apart from any daily measure of the amount required by the body, I should add the free hydrogen also, since with its combination to form water within the body it must generate heat; but we have no means of ascertaining how much heat is produced and required by the body; neither can we ascertain how much of the water which leaves the body is generated in this manner, and how

much is due to that which was taken as food. Hence, in seeking to ascertain how much nutriment is required by the body, we must altogether omit any reference to this element, and must restrict ourselves to the carbon and nitrogen, for as the latter in leaving the body can be measured, they give the best indication as to how much is required to supply their place. This is the only practicable basis for dietary in a physiological point of view, and hence my object is to show in what way the largest amount of carbon and nitrogen can be obtained at the least cost.

I wish I could select terms which would be less technical, and yet be at the same time exact, but I An attempt to do this has been long made. cannot. and this also on purely chemical grounds, by calling some elements heat-givers, and others flesh formers. as though the two had quite distinct actions; but it should be understood that in all the important foods, excepting fat and sugar, both these classes are always found in the same food, so that bread and meat are heat-givers and flesh-formers; and it has been also proved, by the experiments of Messrs. Lawes and Gilbert, myself, and others, that nitrogen-the flesh-former - passes through the body every moment without forming flesh, and therefore cannot always be a flesh-former, and that. whilst in the body, it stimulates vital action, and promotes the change of the heat givers, and is therefore indirectly a heat-generator. Hence physiology has again shown that the clear lines of distinction drawn by chemists and chemistry are incorrect, and lead to error. It is probable that in every case the one kind of food assists the digestion of the other, and it is certain that no such division as heat-giver, and flesh-former can now be tolerated, except in a general and popular sense. It is also necessary to add that I cannot treat of them collectively, or say that a food offers so much nutriment, for these two elements are required by the body in different proportions, and foods differ in the relative quantity of each which they contain.

Hence I must speak of the two elements simply as carbon (the so-called heat giver) and nitrogen (the so-called flesh-former), and it will not be difficult to follow all that is to be said respecting them without any chemical knowledge whatever.

Separate Foods.

BREAD.—I purpose to consider bread as the first and basal element of dietary, both from its extreme importance in relation to the whole dietary, and from its universal use in this country. This may be made of white wheaten flour, brown wheaten flour, rye or barley, or an admixture of these substances. 1 lb. of white wheaten bread, made of household or seconds flour, is worth from a 1¹/₄d. to 1¹/₄d. in different parts of the country, and most frequently 1[§]/₈d. or 5¹/₂d. per 4 lb. loaf. 1 lb. of bread contains 1,994 grains of carbon, and 89 grains of nitrogen, or, in round numbers 2,000 grains and 90 grains, and as the cost is 1¹/₄d., 1[§]/₈d., and 1¹/₄d., the quantity for each 1d. will be as follows :—

	Carbon Grains.		Nitrogen Grains.
At	11d.	1,600	71
	14d.	1.450	66
	1 j d.	1,808	60

I will take the middle quantities as my standard, since it will apply more largely to the country than

38_.