nia which indirectly yields vegetable albumen, the principal constituent of plants. As the food consumed by animals must supply them with what is necessary to support their flesh, and to produce milk, their excrements must be deprived of a part of what the food contained, particularly of nitrogen. When, therefore, a field is manured with animal excrements, a smaller quantity of matter containing nitrogen is added to it than has been taken from it, in the form of grass, herbs, and seeds. Liebeg says:—"By means of manure, an addition only is made to the nourishment which the air supplies." In a scientific point of view, it should be the care of the agriculturist so to employ all the substance containing a large proportion of nitrogen which his farm affords, in the form of animal excrements, that they shall serve as nutriment to his own plants. This will not be the case, unless those substances are properly distributed upon his land. A heap of manure lying unemployed upon his land would serve him no more than his neighbours. The nitrogen in it will escape as carbonate of ammonia into the atmosphere, and a mere carbonacious residue of decayed plants would, after some years, be found in its place. In this manner most of the manure made by Canadian farmers is actually lost to them, by suffering it to remain unemployed in the farm yard until all its best qualities are evaporated. It is then most generally carted out to the field in the heat of summer, and must consequently lose the greater part of the good that may have remained in it, before it is ploughed into the soil. Manure may be very profitably applied to the surface of the soil, when vegetation is active, and it is a most excellent mode of applying it to grass land, or young crops of grain, as it immediately supplies the growing plants with what they require—but to keep it in the yards, without mixing in compost heaps, or to expose it in the field in the heat of summer, until all the best qualities are lost, is very injurious to the farmers who follow this practice, and it is a general one amongst Canadian farmers, we are sorry to say. We hope, however, that it will be discontinued, and a more judicious system of managing manure adopted at once.

In these different substances, some one of which is never wanting in the food of the graminivora, there is added to the nitrogenized constituents of this food, to the vegetable albumen, fibrine, and caseine, from which their blood is formed, strictly speaking, only a certain excess of carbon, which the animal organism cannot possibly employ to produce fibrine or albumen, because the nitrogenized constituents of the food already contain the carbon necessary for the production of blood, and because the blood in the body of the carnivora is formed without the aid of this excess of carbon.

The function performed in the vital process of the graminivora by these substances (sugar, gum, &c.) is indicated in a very clear and convincing manner, when we take into consideration the very small relative amount of the carbon which these animals consume in the nitrogenized constituents of their food, which bears no proportion whatever to the oxygen absorbed through the skin and lungs.

A horse, for example, can be kept in perfectly good condition, if he obtain as food 15 lbs. of hay and 4½ lbs. of oats, daily. If we now calculate the whole amount of nitrogen in these matters, as ascertained by analysis (1-5 per cent. in hay, 2-2 per cent. in the oats,) (15) in the form of blood, that is, as fibrine and albumen, with due proportion of water in blood (80 per cent,) the horse receives daily no more than 4½ oz. of nitrogen, corresponding to about 8 lbs. of blood. But along with this nitrogen, that is, combined with it in the form of fibrine or albumen, the animal receives only about 14½ oz. of carbon. Only about 8 oz. of this can be employed to support respiration, for with the nitrogen expelled in the urine there are combined, in the form of urea 3 oz., and in the form of hippuric acid, 3½ oz. of carbon.

Without going further into the calculation, it will readily be admitted, that the volume of air inspired and expired by a horse, the quantity of oxygen consumed, and, as a necessary consequence, the amount of carbonic acid given out by the animal, is much greater than in the respiratory process in man. But an adult man consumes daily about 14 oz. of carbon, and the determination of Boussingault, according to which a horse expires 79 oz. daily, cannot be very far from the truth.

In the nitrogenized constituents of his food, therefore, the horse receives rather less than the fifth part of the carbon which his organism requires for the support of the respiratory process; and we see that the wisdom of the Creator has added to his food the four-fifths which are wanting, in various forms, as starch, sugar, &c., with which the animal must be supplied, or his organism will be destroyed by the action of the oxygen.

It is obvious, that in the system of the graminivora, whose food contains so small a proportion, relatively, of the constituents of blood, the process of metamorphosis in existing tissues, and consequently their restoration or reproduction, must go on far less rapidly than in the carnivora. Were this not the case, a vegetation a thousand times more luxuriant than the actual one would not suffice for their nourishment. Sugar, gum, and starch, would no longer be necessary to support life in these animals, because, in that case, the products of the waste, or metamorphosis of the organized tissues, would contain enough of carbon to support the respiratory process.

Man, when confined to animal food, requires for his support and nourishment extensive sources of food, even more widely extended than the lion and tiger, because, when he has the opportunity, he kills without eating.

A nation of hunters, on a limited space, is utterly incapable of increasing its numbers beyond a certain point, which is soon attained. The carbon necessary for respiration must be obtained from the animals, of which only a limited number can live on the space supposed. These animals collect from plants the constituents of their organs and of their blood, and yield them, in turn, to the savages who live by the chase alone. They, again, receive this food unaccompanied by those compounds, destitute of nitrogen, which, during the life of the animals, served to support the respiratory process. In such men, confined to an animal diet, it is the carbon of the flesh and of the blood which must take the place of starch and sugar.

But 15 lbs. of flesh contain not more carbon than 4 lbs. of starch, (16) and while the savage with one animal and an equal weight of starch could maintain life and health for a certain number of days, he would be compelled, if confined to flesh, in order to procure the carbon necessary for respiration, during the same time, to consume five such animals.

It is easy to see, from these considerations, how close the connection is between agriculture and the multiplication of the human species. The cultivation of our crops has ultimately no other object than the production of a maximum of those substances which are adapted for assimilation and respiration, in the smallest possible space. Grain and other nutritious vegetables yield us, not only in starch, sugar, and gum, the carbon which protects our organs from the action of oxygen, and produces in the organism the heat which is essential to life, but is also in the form of vegetable fibrine, albumen, and caseine, our blood, from which the other parts of our body are developed.

Man, when confined to animal food, respires, like the carnivora, at the expense of the matters produced by the metamorphosis of organized tissues; and, just as the lion, tiger, hyæna, in the cages of a managerie, are com-