

and at the sametime furnish the annual heat. Liebig calculates that the amount of carbon daily burned in the body of an adult man is about 14 ounces, and that the heat given out is fully sufficient to keep up the temperature of the body, and to account for the evaporation of all the gaseous matter and vapour expelled from the lungs. This carbon is derived, in the first place, from the tissues of the body, which undergo a constant waste, but alternately from the food.

The tissues can only be decomposed from the exercise of the vital functions, and the food of the herbivora contains little of the aluminous compounds, only sufficient to restore the waste of the tissues ; while the carbon required for respiration is supplied by the starch, gum, sugar, oil, &c., which form the great mass of their food, and no such amount of muscular motion is required in them as in the carnivora. It is in the form of bile chiefly, that the carbon undergoes combustion. Hitherto the true functions of the bile has been disputed. The tissues, which are consumed, are resolved first into bile and urate of ammonia. The former is secreted from the bile, and reabsorbed and burned. The latter, in serpents and birds, is expelled unchanged ; but in man and quadrupeds in whom the amount of oxygen inspired is much greater, it also is oxydised, yielding finally carbonic acid, ammonia, and urea. The urine of the herbivora differs from that of man, in containing, besides urea, much hippuric acid, when they are at rest or stall fed, and benzoic acid when they are in full exercise, and when, consequently more oxygen is supplied. The bile of the herbivora is much more abundant than that of the carnivora—an ox secreting, according to Burdach, 37lbs. of bile daily. As the waste of matter in the herbivora is but limited, it is obvious that it cannot supply all the bile, and, consequently, a great part must be derived from the starch and other new azotized constituents of their food, which lose oxygen, and enter into combination with some azotised product of the decomposition of the tissues. Soda is unnecessary for the formation of the bile, and is supplied in the form of common salt : when the supply of soda is defective, the metamorphosis of alluminous compounds can yield only fat and urea. In the urine of the herbivora, soda is present in far larger quantity than that of the carnivora, and combined with carbonic, hippuric, or benzoic acid. This shows that the herbivora require a far greater amount of soda than is contained in the amount of blood—constituents daily consumed, which in them is small ; and this soda is obtained from their food, and employed in producing their abundant bile. The plants on which the herbivora feed cannot grow in a soil destitute of alkalies ; but these alkalies are not less necessary for the support of the animals than of the plants. The soda is found in the blood and bile ; and the potash is now known to exist in large quantity in the juice of flesh, and to be absolutely essential to the production of bone in the animals which feed on these plants. It is impossible not to be penetrated with admiration of the wisdom which is shown in these beautiful arrangements.

“Let us now consider the changes which the food undergoes in the process of digestion. When the food has entered the stomach, the gastric juice is poured on it, and after a short time the whole is converted into a semifluid homogeneous mass, the chyme. Many researches have been made to discover the solvent contained in the gastric juice, but in vain. It contains no substance which has the property of dissolving fibrin, albumen, &c., we are compelled to adopt the opinion of Liebig, according to which the food is dissolved in consequence of a metamorphosis analogous to fermentation, by which a new arrangement of the particles is effected. As in fermentation, the change is owing to the presence of a body in a state of decomposition or motion, what is propagated from the ferment to the sugar in contact ; so, in digestion, the gastric juice contains a small quantity of a matter derived from the living membrane of the stomach, which is in a state of progressive change ; and the change or motion is