

ment of the several parts of each papillæ showing an evident adaptation to the reception of gustatory impressions.

The filiform appendages entangle and delay the smaller particles of the food, and the cavities of the papillæ receive the nutritious juices, and retain it for a time sufficiently long to produce the necessary impression on the sensory papillæ by which each cup is encircled.

Considered altogether, it would be difficult to imagine or devise an arrangement of parts more admirably adapted to the purpose to be fulfilled.—*Lancet*, March 1849.

4. *On the Minute Structure and Mode of Contraction of Voluntary Muscular Fibre.* By W. MURRAY DOBIE, Esq.—The first part of the author's paper contains a short statement of the various discoveries which have been made in the minute structure of voluntary muscle. The last author referred to is Mr. Bowman, who has described the ultimate fibrilla of muscle as composed of clear and dark spaces, arranged alternately in longitudinal series. The author then refers to the descriptions taken by various writers from the specimens of muscular fibre prepared by Lealand, a London optician. These specimens show the ultimate fibrilla to consist of clear, oblong, rectangular spaces, bounded by a distinct line, and joined end to end. In the centre of each there is a small, dark, oblong space, between which and the peripheral line of the clear space, there is a clear interval. From his observations on the muscles of all classes of animals, the author considers that the structure of muscle is still more complex than has yet been described. He finds an ultimate fibrilla to consist of quadrilateral spaces, which are of two kinds—the dark and the clear; these alternate regularly, and are arranged in single longitudinal series.

The dark and the clear spaces are sometimes equal in length—more frequently the latter are the shortest, and in the lobster and salmon appear sometimes as a mere line. When the fibre is stretched, the clear space is elongated and flattened, while the dark space appears somewhat elevated. These spaces are bounded laterally by a distinct line, which appears continuous; they are also separated from each other by distinct lines.

The clear space is crossed transversely at right angles by a *dark* line, which divides it into two equal quadrilateral spaces. The dark space is similarly divided by a *clear* line. Each space, therefore, consists of two compartments, which are similar in every respect to each other. Such is the appearance presented when the centre of the fibrilla is in perfect focus. When the surface is brought into focus, the light space appears *dark*, and does not show a cross line; while the dark one appears light, and shows the cross line *dark*, and more decided than before. The author has further found that, when the fibrillæ are separated, a delicate homogeneous membrane stretches from one to the other. This membrane is quite distinct from, and much more delicate than, the sarcolemma. In the skate it is striated, the striæ corresponding to those seen on the fibrillæ: this appearance is attributed to the membrane being more elevated or thicker opposite the dark spaces.

The author has made some observations on the contraction of muscular fibre, as it is seen to take place in the tail of the tadpole, when the animal is placed uninjured under the microscope. On contraction taking place, the transverse striæ are seen to approach rapidly, and to recede as rapidly on relaxation. The blood is driven from the part by the contraction of the muscle, but again returns on relaxation taking place.

Mr. Dobie concludes his paper with some directions as to the mode of preparing specimens.—*Monthly Retrospect*, from *Annals of Nat. Hist.*, Feb. 1848.

ORGANIC CHEMISTRY.

5. *Chemical Pathology of Diarrhœa.*—OESTERLIN, in *Henlé and Pfeuffer's Zeitschrift*, Bd. VII. Heft 3, contributes an important paper on the Chemistry of Diarrhœa, a disorder which is exceedingly prevalent in the Baltic provinces, especially in conjunction with ague and malaria disorders.

The older chemical schools attributed extraordinary appearances to the excrements, bile, and blood of the dysenteric, but valid researches have not yet been made; so that this disease, which offers most to the chemist, has perhaps been most neglected by him. And in pursuance of these pathological errors, therapeutic singularities have obtained. Diarrhoea has been treated with mercurials, since the bile is supposed to act some mysterious part in the tragedy; or patients already purged ten and twenty times in the hour, have been treated with laxatives, on account of an alleged dependence of tenesmus on accumulation of feces. It was only a few years ago that Masselot, and Follet, for the first time analyzed the blood in this disease; and their analyses, grouping many cases together, will allow little stress to be laid on the results.

Many circumstances had for fifteen years drawn the author's attention to the evacuations in these diseases, especially in the cases seen in the Baltic epidemic of the autumn, 1846. Their appearance, the blood they contain, their physical properties, and their enormous quantity in the twenty-four hours, all indicate them as an important element of the disease. So, likewise, the often rapid collapse, the rapid wasting (especially of the face), and the manner in which persons previously in robust health are completely prostrated, all these circumstances, which are unexplained by anatomical alterations in the intestinal canal, point to the statement, that the materials set free from the body greatly preponderate over those taken into it, and that this preponderance occurs with a rapidity and intensity differing only in degree from Asiatic cholera. But though the dependence of the two sets of facts be apparently obvious enough, yet he had never seen any experiments upon either the composition or quantity of the evacuations. After long delay, a favorable opportunity presented itself in the following cases:—

The three first were of diarrhoea; the last was the diarrhoea occurring in the latter stage of Bright's disease. They seem to have been severe, but not extraordinary cases, and the examinations were not made in the earliest and most acute stage. The first and last terminated fatally; the others completely recovered. The analyses were conducted with the assistance of Dr. C. Schmidt. The method of examination, in most instances, included the urine; but the small quantity of this, and, in all but the taste, its healthy character, precluded any error of consequence.

In the four cases, on an average, the quantity of evacuation in the twenty-four hours, amounted to 2433 cubic centimetres, or to 721 cubic inches English.

The average of nine examinations gave the daily loss of albumen $50\frac{1}{2}$ grammes, or $782\frac{3}{4}$ grains English. The albumen was (a) albumen of serum (b) epithelial structure; on an average of three comparisons, the latter amounted to one-sixth of the former variety.

On an average of eight examinations, the quantity of fixed salts thus removed in the twenty-four hours was $14\frac{1}{2}$ grammes, or $224\frac{1}{2}$ grains English.

The author compares the large quantity of albumen thus obtained with two other cases; one the flux produced by calomel and jalap, in a case of chronic disease of the brain; the other, the (loose?) stools of a typhoid patient. In the diarrhoea, the albumen amounted, in the average of eight examinations, to 24.75 parts in the thousand; in the two latter instances, to about $3\frac{1}{2}$ parts per thousand, the two being nearly alike, 3.3 and 3.9. This is scarcely a seventh of the preceding quantity.

Comparing the composition of the stools with that of the blood, from which they must be derived, the following points are noticeable:—

The quantity of albumen in the whole blood-mass may be estimated at 800 or 900 grammes—about $29\frac{1}{2}$ oz. English. Thus, in less than three weeks, such a daily loss as the estimate above would equal the whole quantity normally present. Or, daily, a seventeenth of the whole quantity is removed. Again, taking the quantity of fixed salts present in the blood as about one-tenth of the albumen, the daily loss may be estimated at $\frac{1}{170}$ th of the whole quantity in the blood.

The *absolute daily loss* of albumen fluctuated considerably; but the *per centage* of albumen present, or its number of parts in the thousand of evacuations, had a very constant and well-marked relation to the severity and date of the disorder; subsiding as it subsided, or aggravated on its relapse.

Some blood taken by cupping was examined in two instances. In both the quantity of water was increased, the quantity of salts was nearly normal, while the remaining constituents had decreased. The impoverished blood had been able to replace the water lost, while the organic constituents were still missing.

The author goes on to apply these chemical results, to explain the condition of the different organs and functions. The small anæmic pulse, the sunken eye, the small quantity of urine, the condition of the secretions generally, are all referred to in turn. But our readers will have heard or read most of these before. We have, therefore, only to add, that he appears inclined to regard diarrhoea as essentially a chemical process, manifested by the tendency to thickening of the mucous membrane, and exudation from it. To this we can only say, that on like grounds we must call all secretion, both healthy and morbid, a *chemical* process. This we must hesitate to do. Yet, until we can state why the healthy intestine secretes healthy intestinal mucus, we cannot tell why the diseased one should separate its diseased product, however different in appearance and quality the latter may be.—*Med. Times*, May 19, 1849.

6. *On the Source of Sugar in the Animal Economy.* By Dr. BERNARD.—Sugar is extensively distributed throughout the vegetable kingdom, but it exists also in animals. Vegetables do not find it ready made in the earth, but form it by some power of internal organization. Is it the same with animals? or is the sugar found in their bodies exclusively the product of their vegetable ingesta? This is the important question which it is our intention to submit to the test of experiment.

Sugar enters largely into the composition of the food of animals. The kinds of sugar are,—1st. Cane sugar, such as is found in the sugar-cane, beet-root, carrots, &c. 2d. Grape sugar, such as exists in grapes, and other saccharine fruits. Fecula should also be considered as saccharine matter, inasmuch as it is convertible into low sugar during the process of digestion. 3d. Sugar of milk, which is found in the milk of animals.

This is not the place to trace the distinctive characters of these forms of sugar, nor to determine the alternate changes which they undergo in order to become subservient to nutrition. I need only state, that as certain alimentary substances are known to furnish considerable quantities of sugar, we may consider them as the source of the saccharine matter which we discover in the blood, or other animal fluids. It is admitted that sugar is to be found in the healthy blood, after the ingestion of sugar, or matters convertible into sugar. But chemical facts teach us, on the one hand, that starch is the only principle which is convertible into sugar; and, on the other hand, in the belief that the animal economy has not the power to originate a principle, but only to transform those which are presented by the vegetable kingdom, it has been denied that the animal organism can form sugar, and the only power recognized is that of destroying and eliminating it. The facts which will be developed in the following essay, show us that such an opinion is not warranted by physiology.

FIRST SERIES OF EXPERIMENTS.—It has been observed, that during the digestion of saccharine or amylaceous matter, the blood contains sugar, and it has thence been concluded that the sugar is furnished by the aliments. The result of experiment taken alone is exact; but the experiment itself is incomplete, and the conclusions therefore false, as will be seen.

1st *Exp.* I injected thirty grains of starch, dissolved in a pint of water, into the stomach of a rabbit which had eaten oats and carrots. Five hours after, the animal was destroyed in the usual way, and thirty grains of blood from the heart collected. After coagulation, sugar was distinctly found in the serum. The stomach and intestines contained sugar, arising from the carrots and the transformation of the farina.

2d *Exp.* A strong dog was destroyed five hours after eating 300 grains of the jelly of starch. The serum of the blood taken from the heart contained a notable quantity of sugar. The contents of the stomach were acid, and contained no sugar; those of the intestines were alkaline and strongly saccharine.