tion a substance of whose existence in milk many people were entirely ignorant, but to which, in a philosophical point of view, the greatest amount or attention was due—he meant the sugar of milk. In a chemical point of view, milk consisted of five parts—butter, curd, milk, sugar, water, and saline matter. The diagram on the wall gave the relative quantities of these ingredients in different kinds of milk.

COMPOSITION OF MILK.

	Woman.	Cow.	Ass.	Goat.
Casein (pure curd)	1·52	4·48	1·82	4·08
Butter, ...	3·55	3·13	0·11	3·32
Milk sugar.	6 50	4 77	6 08	5·28
Saline matter, ...	0 45	0 60	0·34	0·58
Water, ...	87 98	87 02	91 65	88 60
	100·00	100 00	100 00	100 00

The sugar of milk, it would seem, existed in considerable quantity in it, equalling in the cow the weight of the curd. In England, he believed it was never prepared for domestic or other purposes; but in Switzerland, it formed a considerable article of commerce. Mr. Way exhibited a specimen of milk sugar, and observed that it would be found to possess only a slightly sweet taste, which was due to its very limited solubility. This circumstance prevented its extensive use as a substitute for ordinary sugar, because it could only be employed in the form of a syrup, and required so much water to dissolve it as greatly to reduce the strength of any liquid to which it is added. Now, milk sugar, although by itself, or solution in pure water, it would keep well, was very likely to change when in contact with bodies having the nature of ferments. Milk was, when drawn from the cow, slightly alkaline to test paper; but in a short time it became sour and curdled. This souring was due to the production of an acid from the sugar, which had, from this circumstance, been called the *lactic acid*, or the acid of milk. The same compound was formed in many other circumstances, and its production was not confined to milk sugar, but occurred in the other forms of sugar. Thus lactic acid was produced when cabbage was cut up and allowed to become sour, forming the sour-krout of the Continent. The sourness of brewers' grains is due to the same acid. Mr. Way exhibited a diagram which showed how easily the sugars could pass into lactic acid.

RELATION OF SUGAR TO LACTIC ACID.

	Carbon.	Hydrogen.	Oxygen.
Cane Sugar, ...	12 equi	12 equi.	12 equi.
Grape Sugar, ...	12	14	14
Milk Sugar, ...	24	24	24
Lactic Acid.	6	6	6

Thus milk sugar was in relation to the acid in question of such composition that one equivalent or combining proportion of it could, without adding to or subtracting from its component parts, produce four equivalents of lactic acid. Now in the natural souring of the milk this transformation occurs; but the question arises, how is it brought about? Mr. Way had before stated that ferments in general had this power of acidifying milk sugar It was an axiom with chemists that ferments are substances in a state of decay, and in virtue of that state capable of imparting it to the other substances. The difference between a ferment and a fermentable substance was in general this:—The body producing a ferment was liable to change by simple exposure to air. The body in which the fermenting process can be induced, is not liable to change by exposure to the air, but in the presence of the ferment is capable of ready conversion. The class of ferments generally contain nitrogen; the bodies liable to fermentation do not. Mr. way had collected in a table some of the more important of the proximate principles containing nitrogen, and also some of those which do not contain this element.

NITROGENOUS PROXIMATE PRINCIPLES (MULDER).

	Gluten of Wheat.	Casein from Milk.	Fibrin from Blood.	Albumen From Eggs.	Albumen From Blood.
Carbon, ...	54·75	44 96	54 56	54 48	54 84
Hydrogen, ...	6 99	7 15	6 90	7·01	7·09
Nitrogen, ...	15 71	15 80	15 72	15 70	15·83
Oxygen, ...	21·93	21 73	22·13	22 00	21·23
Phosphorus, . . .	. . . .	. . .	0·33	0 43	0 33
Sulphur, ...	0·62	0 36	0 36	0 38	0 68
	100·00	100·00	100 00	100 00	100 00

NON-NITROGENOUS PROXIMATE PRINCIPLES.

	Starch.	Gum.	Cane & beet root Sugar.	Grape Sugar.	Milk Sugar.
Carbon, ...	44·47	45 10	44 92	40·47	42 57
Hydrogen, ...	6 28	6·10	6·11	6 59	6·44
Oxygen, ...	49 25	48 80	48 97	52 94	50 99
	100 00	100 00	100 00	100 00	100·00

Amongst the former would be found *Casein*, the name given by chemists to the principle which is found in the curd or cheese of milk. Casein, as it existed in milk, was in a fluid or semi-fluid state, but most people were familiar with it in the form of curd. If the curd of milk, carefully separated by pressure from the whey, was exposed to the air, it soon began to acquire a putrid smell; in this state it would, if mixed with sweet milk, rapidly cause it to turn sour. The same thing happened in the case of the natural souring of milk; by the exposure of the casein to the air it underwent a change which enabled it to act on the milk sugar, converting it into lactic acid. This souring of milk was influenced by a variety of circumstances, to some of which Mr. Way would allude presently; but his present object is to explain and to enforce upon their attention the consecutive changes occurring—first, by the action of the air on the curd, and secondly by the influence of the ferment so produced upon the sugar of the milk. A right understanding of these changes would simplify and explain the greater part of the phenomena which presented themselves in the operations of the dairy.

It was well known that the most minute precautions were necessary in the management of a dairy. One of the most important of these was temperature. The action of the air upon nitrogenous substances was in all cases, favoured by a moderate elevation of temperature. Practically this circumstance was well understood and applied in the construction of dairies, which were usually sunk below the level of the earth, and were as far as possible shaded from the direct rays of the summer's sun. The use of water as a means of regulating temperature was also known; the plentiful sprinkling of the walls, the floor and the benches, being intended to reduce the temperature by the cold produced in the evaporation. But Mr. Way thought that, by a little ingenuity much greater advantage might be taken of this well-known law of evaporation; thus, for instance, it seemed to him perfectly practicable to imitate in dairies the methods of producing cold which were practiced in hot climates. One of these was to cover the opening of communication with the external air by mats kept constantly wet, which insured a cool and refreshing breeze. In many instances where the command of