tary particles are in a state of molecular transition. During life, the higher organic constituents of the blood are capable of undergoing the changes of assimilation on exposure to contact with oxygen, and there is a considerable destruction of sugar effected; for a short period after death these azotized constituents remain stationary and uninfluenced by oxygen, and with this, there is a corresponding suspension of the transformation of sugar; but finally, the animal matter of the blood on contact with oxygen, especially during a warm temperature, assumes a state of decomposition, the molecular changes of which again excite the destruction or metamorphosis of saccharine matter.

The sugar *disappears far less rapidly* from diabetic blood under the influence of exposure to the atmosphere, than from healthy right-ventricular blood. From these, and a few other observations which he has as yet been able to make on the blood in Diabetes Mellitus, the author, were he to hazard an opinion on the nature of that obscure disease, would be disposed to say that there appears to be a modification of sugar produced by the liver, which is not susceptible of undergoing the normal process of destruction in the animal system, and which, therefore, accumulating in the blood, is eliminated by the kidneys. The experiments of Bernard have shown that vegetable glucose (grape-sugar) is not susceptible of destruction in the processes of animal life, unless converted into animal glucose by the agency of the liver. Diabetic sugar would therefore seem to bear a resemblance in its physiological relations to vegetable, rather than to animal glucose.

The following communications were in part read:—

I. "Researches on the Partition of Numbers." By Arthur Cayley, Esq., F.R.S. Received April 14, 1855.

The author discusses the following problem:—"To find in how many ways a number q can be made up of the elements $a, b, c \ldots$, each element being repeatable an indefinite number of times." The solution depends upon a peculiar decomposition of an algebraical

fraction $\frac{\phi x}{fx}$, where the denominator fx is the product of any number of factors, the same or different of the form $1-x^m$, and upon the expansion by means thereof of the fraction in ascending powers of x. The coefficient of the general term is expressed in terms of circulating functions, such that the sums of certain groups of the coefficients are severally equal to zero; these functions the author calls prime circulators. The investigations show the general form of the analytical expression for the number of partitions, and they also indicate how the values of the coefficients of the prime circulators entering into such expression are to be determined.

II. "Further Researches on the Partition of Numbers." By Arthur Cayley, Esq., F.R.S. Received April 14, 1855. With Postscript. Received April 20, 1855.

The memoir contains a discussion of the problem "to find in how many ways a number q can be made up as a sum of m terms with the elements 0, 1, 2,.... k, each element being repeatable an indefinite number of times." The number q may without loss of generality be taken to be equal to $\frac{1}{2}(km-\alpha)$, and the expression for the number of partitions of this number $\frac{1}{2}(km-\alpha)$ is by a peculiar method reduced to the form coeff. x^m in $\frac{\phi x}{fx}$, where $\frac{\phi x}{fx}$ is an algebraical fraction, the form of which depends on the value of k, *but which does in anywise involve the number* m; the denominator fx is the product of factors of the form $1-x^\theta$, and up to certain limiting values of α the fraction is a proper fraction. The author remarks in conclusion that the researches were made for the sake of their application to the theory developed in his "Second Memoir upon Quantics."