January 6, 1859.

Sir BENJAMIN C. BRODIE, Bart., President, in the Chair.

The following communications were read:—

I. Letter to Dr. SHARPEY, Sec. R.S., from Dr. THOMAS WILLIAMS, F.R.S., dated Swansea, Dec. 12, 1858.

In my paper entitled "Researches on the Structure and Homology of the Reproductive Organs of the Annelids," lately published in the Philosophical Transactions, the following passage occurs in a note at page 113:—"Some of these demonstrations have been recently witnessed by Mr. Busk and Dr. Carpenter."

Some time after the publication of my paper, I received a letter from Mr. Busk, observing that when taken in connexion with the context, the above allusion to his name and that of Dr. Carpenter might lead to the supposition that they acquiesced in the views which I ventured to advocate in my paper.

If permitted, I should be glad to state, that although I had shown to Mr. Busk and Dr. Carpenter certain of my dissections, and although I was favoured at the time with what I believed to be their concurrence and approbation, I am most anxious at present to explain that in referring to their names, I had no intention whatever to implicate them in the opinions which I entertained.

I remain, &c.,

THOMAS WILLIAMS, M.D., F.R.S.

II. "A Sixth Memoir on Quantics." By ARTHUR CAYLEY, Esq., F.R.S. Received November 18, 1858.

(Abstract.)

I propose in the present memoir to consider the geometrical theory: I have alluded to this part of the subject in the articles Nos. 3 and 4 of the introductory memoir. The present memoir relates to the geometry of one dimension and the geometry of two dimensions corresponding respectively to the analytical theories of

binary and ternary quantics. But the theory of binary quantics is considered for its own sake; the geometry of one dimension is so immediate an interpretation of the theory of binary quantics, that for its own sake there is no necessity to consider it at all; it is considered with a view to the geometry of two dimensions. A chief object of the present memoir is the establishment upon purely descriptive principles of the notion of distance.

III. "On the Mathematical Theory of Sound." By the Rev. S. EARNSHAW. Communicated by Professor W. H. MILLER, For. Sec. R.S. Received November 20, 1858.

(Abstract.)

The principal feature of this communication is the discovery of an integral of a certain class of differential equations. This class includes, as a particular case, the differential equation of motion when a disturbance is transmitted through a uniform elastic medium confined in a horizontal tube. If the equation $\frac{dy}{dt}=\mathrm{F}\left(\frac{dy}{dx}\right)$ be differentiated with regard to t, it produces the equation

$$\frac{d^2y}{dt^2}=\left\{\mathrm{F}'\left(\frac{dy}{dx}\right)\right\}^2 \cdot \frac{d^2y}{dx^2};$$

which, by means of the general function F′, can be made to coincide with any proposed differential equation in which the ratio between $\frac{d^2y}{dt^2}$ and $\frac{d^2y}{dx^2}$ is dependent on $\frac{dy}{dx}$ only. The integral obtained in this manner is that which arises from the elimination of (α) between the two following equations,—

$$y=\alpha x+\mathrm{F}\,(\alpha)\,.\,t+\phi\,(\alpha),$$
$$0=\ x+\mathrm{F}'(\alpha)\,.\,t+\phi'(\alpha).$$

This integral, though not found by the direct integration of the differential equation, and though evidently not the general symbolical integral of it, is proved to be the general integral for wave-motion, from its affording the means of satisfying all the necessary equations of initial disturbance and wave-motion.

The author first discusses wave-motion when temperature is supposed to be unaffected by the passage of a wave; and then when the