The close correspondence between the experimental and the calculated curve tends to substantiate the original assumption that it is excess substrate which inhibits this particular enzyme. From the theory of the two-step reaction systems[5] another point of interest may be derived from the present work. If the enzyme has the same affinity for both the first and second substrate molecules, the value of the quotient $K_{ss}/4K_m$ will be unity. If the affinity is greater for the first substrate molecule, the ratio will be greater than unity. It is obvious that the second alternative holds in the present case, namely, that dextransucrase has a much greater affinity for the first substrate molecule than it does for the second.

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Determination of the Mass Thickness of Cell Membranes from their Electron Micrographs

In this communication, we give values of the mass thicknesses of the cell membranes of *Bacterium coli*, human red blood corpuscle and *Leishmania donovani* estimated as follows.

Purified normal cells in each case were disrupted by chemical means to remove the cellular contents. The cell membranes, after separation, were collected on collodion-coated grids, and after drying only collapsed cell membranes remained. These were then examined with a Siemens 'Elmiskop I' electron microscope at 60 kV. with an objective aperture angle of $\sim 10^{-2}$ radian, and afterwards photographed on Ilford Process plates. After due processing of the plates, the photographic densities D_t and D_0 in the imaged region and in the background respectively were measured with a densitometer. For the photographic negative used, it was found from a previous experiment that the γ value under the above working and processing conditions was 2·8 within the photographic density-range 1·5–3·0.

Since in a photographic negative containing both the specimen and the supporting film regions, the time of exposure was the same, it followed that the respective measured densities D_0 and D_t were related to the corresponding electron intensities by the relation:

$$D_0 - D_t = 2{\cdot}8 \log_{10} (I_0/I_t) \qquad (1)$$

It is known from the electron scattering formula of Liesegang[1] that in the electron microscope the image intensity I_t is related to the object mass thickness ρx by the expression,

$$I_t = I_0 \exp\left(-\frac{N_A}{\pi} \cdot \frac{Z^{4/3}}{A} \cdot \lambda^2 \cdot \rho x\right) \qquad (2)$$

where the symbols have their usual meanings.

It has been shown by Zeitler and Bahr[2] that for various biological materials equation (2) can be written as:

$$I_t/I_0 = \exp(-4{\cdot}43 \times 10^4 \rho x) \qquad (3)$$

for 60 kV. electrons. Combining equations (1) and (3), ρx is given by:

$$\rho x = \frac{D_0 - D_t}{2{\cdot}8} \times 52{\cdot}4 \ \mu\text{gm.cm.}^{-2} \qquad (4)$$

The relevant data and the corresponding mass thicknesses of the cell membranes are given in Table 1.

Table 1. Mass Thickness of Cell Membranes

Specimen	Photographic density		Mass thickness of the cell membrane ρx (μgm.cm.$^{-2}$)	Computed thickness assuming $\rho = 1$
	D_t	D_0		
(Cell membrane) *Bacterium coli*	2·29	2·49	1·86	186 A.
Human red blood cells	1·58	1·85	2·51	251 A.
L. donovani	2·54	2·88	3·16	316 A.

The mass thickness of the cell membrane, as calculated from equation (4) with the help of the data in columns (2) and (3) above, is really the density multiplied by twice the membrane thickness, as the two membranes collapse together and provide the photographic density D_t. So the mass thickness of a single membrane of a cell would be half that of the value estimated from equation (4) and has been recorded in column (4).

Assuming the value of unity for ρ, the density of the material composing the membranes, the respective membrane thicknesses are as recorded in column 5. These values are to be compared with the thickness values of (100–150 A.), (120–300 A.) and 250 A. respectively reported by other workers[3–5].

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A New Method of tracking Artificial Earth Satellites

Existing instruments for making precise trajectory observations on artificial Earth satellites generally employ photographic techniques, a good example being the Schmidt–Baker–Nunn cameras of the Smithsonian Astrophysical Observatory. Since the launching of *Sputnik* 2, we have been experimenting with optical tracking by a photo-electric method which appears capable of adequate sensitivity and a precision comparable with that of astronomical observations, and thus high enough for observing the non-secular perturbations of a satellite orbit. The principal