X-ray (iron $K\alpha$) results for the corresponding quantities. There is no indication, so far, that the magnitude of the rocking angle is influenced by the particular crystalline plane, the temperature or the composition of the glass surface.

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[1] Bannon, J., and Curnow, C. E., *Nature*, **161**, 136 (1948).
[2] Wyllie, M. R. T., *Rev. Sci. Instr.*, **18**, 425 (1947).

Determination of the Instants of Totality in Solar Eclipses

Banachiewicz proposed in 1928, and Bonsdorff and Lindblad carried out later, the precise determination of the instants of totality at distant places——in different continents—for calculating such distances. It is a sort of triangulation in which the distance moon–earth serves as a basis. Cinematography of the solar crescent and of a time signal with a teleobjective or with an objective-prism was used. The time of totality was calculated by extrapolation of the length of the solar crescent, by observing the cutting of the crescent by the moon's mountains and by photometry of the 'flash spectrum' lines.

The length of the crescent grows only with the square root of the time interval from totality, the moon's mountains move with the first power of the time, and their observation requires very good photographic images. The total intensity of the crescent grows in first approximation with the 3/2 power of the time: $i = i_c + a(t - t_0)^{3/2}$, where i_c is the intensity of the corona and a is the speed of the shadow of the moon upon the sun. Photometry of this total intensity, by chronographic photocell or by cinematography of the pupil of the telescope, is more precise than the methods indicated above and simpler than the photometry of particular flash-spectrum lines. The instruments must record the intensity of the corona and that of the crescent plus corona at a number of points—at least two. Relative photometric values are sufficient. If m_1, m_2 are the relative intensities of crescent plus corona in regard to that of the corona at two instants t_1, t_2, the time of totality contact is

$$t_0 = \frac{(m_1 - 1)^{2/3} t_2 - (m_2 - 1)^{2/3} t_1}{(m_1 - 1)^{2/3} - (m_2 - 1)^{2/3}}.$$

If the sensitivity of the instruments is high enough, it should be possible to work successfully even if the sky is clouded. As two out of three eclipses are occulted by clouds and as observation at two distant places is required, the probability of success should increase by a factor of nine.

Assuming a smooth edge of the lunar shadow, calculations show that the mean photometric error of one determination should easily be brought down to less than 0·01 sec.

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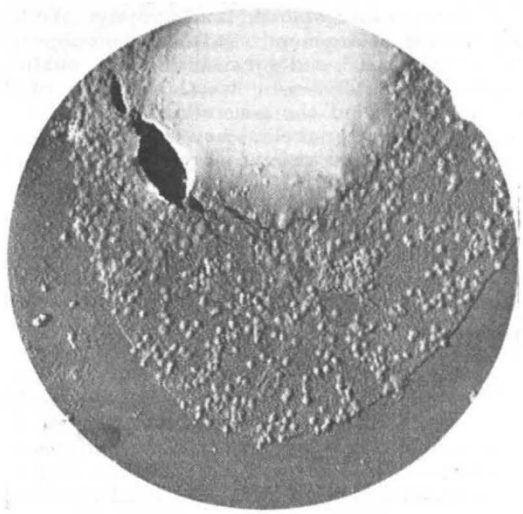
Electron Microscope Studies on the Interaction of Certain Viruses with Fowl Red Cell Membranes

The red cell agglutination test[1] has proved an invaluable means for the rapid assay of certain viruses, namely, influenza, Newcastle disease, fowl plague and mumps, and furthermore the red cell–virus system is serving as an experimental model for investigating some of the factors involved when a virus attacks a susceptible cell[2,3]. We have for some time been interested in the possibility of gaining direct optical evidence on the mechanism of the process. The membranes of the laked red cells can be successfully photographed in the electron microscope (Wolpers[4], Dawson and MacFarlane[5]), and this enables an optical study of the interaction of viruses with such membranes to be made.

Freshly washed fowl red cells are lysed by means of saponin[6] and again carefully washed. Such suspensions of cell 'ghosts' are mixed with the virus preparation under appropriate conditions for adsorption to take place, then washed and fixed with osmic acid, prior to mounting on the collodion film with the aid of an ordinary light microscope. The specimen is then shadowed with palladium ready for examination in the electron microscope.



Laked fowl red cell with *P.R.*8 strain of influenza virus adsorbed. Shadowed with palladium. Magnification, × 6,600

The most impressive photographs of adsorbed virus bodies have been obtained, and one showing adsorbed influenza virus accompanies this communication. Important points emerging from the early photographs were: (i) the general random distribution of virus bodies with no evident set pattern. As the surface is progressively packed with virus, then a close matt of virus covers the entire membrane surface. (ii) Counts of the numbers of particles per given area of membrane parallel the concentrations of virus determined on the fluids by other methods. A basis for roughly quantitative study of certain virus-cell relationships is thus provided. (iii) The adsorption is selective, and when the cell 'ghosts' are added to freshly harvested allantoic fluid, relatively clear pictures can at once be obtained. Space does not permit mention of the many interesting lines of study that this method opens up and which