the reaction, pyruvic acid was isolated as 2, 4 dinitrophenylhydrazone, confirming the removal of hydrogen from the lactic acid. Other hydroxyacids, namely, glycollic and tartaric, behaved similarly though less vigorously. Malic acid gave irregular results, and in this connexion it is noteworthy that we added no co-enzyme to the diluted saps. Hydroxyl groups were not oxidized in a number of other substances tried, including β-hydroxybutyric acid and catechol. Succinic and pyruvic acids were also found inactive. There is thus good reason to presume the existence in barley tissues of the system:

$$\underset{\text{lactic dehydrogenase}}{CH_3\,CHOH\,COOH} + \underset{\text{ascorbic oxidase}}{\text{Ascorbic Acid}} + O_2$$
$$H_2 \rightarrow \qquad\qquad H_2 \rightarrow$$

Lactic and pyruvic acids have been reported in barley tissues and we have no reason for believing this system unable to play a part in barley respiration. Mr. C. R. C. Heard, working in this laboratory, has found that addition of ascorbic acid accelerated the decomposition of hexosediphosphate by barley saps. A fuller discussion of the status of this system is being presented elsewhere; but it may be remarked that it seems to us improbable that any one mechanism is solely responsible for the respiratory oxidations. It is, perhaps, significant that although catechol oxidase is absent from barley, we have been able to satisfy ourselves of the presence of small quantities of cytochrome.

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Elastic Scattering of Fast Electrons by Nitrogen Nuclei

SCHERRER and his collaborators[1] have recently published results indicating that the scattering of electrons of energies up to 3·5 Mv. by nitrogen nuclei is anomalous, in that the observed scattering is many times greater than that to be expected on Mott's theory[2]. In particular, they apply a correction amounting to nearly 400 per cent for the geometry of the expansion chamber. This correction is necessitated by the rigid criteria adopted for the selection of tracks for measurement, and they suggest that the agreement between my results and theory, in the region 0·4–1·1 Mv., might be due to the omission of such considerations. In my measurements, however, examination of the tracks was made, not by stereoscopic reprojection, but by microscopic examination of the images on the camera plates in the manner so successfully introduced by Blackett for α-ray collisions. Tracks which after collision are only a few millimetres long are then easily measured as regards general direction. Even with the stereoscopic method such as I used in later work, large-angle collisions are quite easily detected, although they cannot be measured very accurately.

As I have often stressed, the adoption of rigorous criteria in track selection is of great importance in securing reliable results, and with ample data available, Scherrer's angular limitation criterion is highly desirable. In common practice, however, the experimenter is usually faced with the unpleasant alternative of strict selection criteria plus large statistical fluctuation, or less rigid criteria accompanied by less statistical fluctuation.

In my work, a total of 201 collisions was considered in an energy range 0·4–1·1 Mv., whereas Scherrer observed only about eighty collisions in the same energy range. For scattering between 20° and 60° his results are, *in this energy range*, not in appreciable disagreement with theory when statistical fluctuations are considered. For angles greater than 60°, reference to my own results shows that the scattering rises somewhat above the theoretical values, although statistical fluctuations would not allow a comparison to within ± 50 per cent. From Scherrer's more limited data, however, he deduces an excess above the theoretical value by a factor of 10. In view of the fact that he finds an excess of about five times the theoretical value for energies so low as 0·15 Mv., whereas Neher[2], using a Faraday cylinder arrangement, found an excess of only 30 per cent at this energy for the light element aluminium, it seems possible that Scherrer's result may be a considerable over-estimation. Combined with Stepanowa's[2] results, however, the evidence is now strong that nitrogen exhibits marked excess scattering of electrons at energies greater than 1 Mv.

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[1] *Helv. Phys. Acta*, **85**, 14 (1941).
[2] *Rep. Phys. Soc.*, 1938.

Origin of the Automatic Microtome

IN his very sympathetic obituary notice on W. H. Caldwell in NATURE of Nov. 8, p. 557, Dr. G. P. Bidder asks all biologists to remember that they owe to Caldwell the ribbon method of cutting paraffin sections. In this connexion I would like to direct attention to a short account of the invention of the microtome for cutting continuous ribbons of paraffin sections written by the late Sir Richard Threlfall, in *Biological Reviews*, **5**, 357 (1930). Caldwell and Threlfall were contemporaries and friends at Caius; both were then scholars and later on fellows of the College. In a characteristically personal manner, Threlfall recounts in his article how when he was still an undergraduate he discussed with Caldwell their joint invention, and he tells the part that he himself played in making the new type of microtome which was to become an essential tool of zoologists. Threlfall's article includes a photograph of a copy of the original instrument; this copy is now in the Science Museum, London. The original instrument is in the Zoology Department, Cambridge.

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Distribution of Energy among the Cathode Rays of a Glow Discharge

EXPERIMENTS have been carried out to determine the energy distribution among electrons originating in the cathode dark space of the glow discharge through gases. Two methods have been employed: a method of retarding potential applied to electrons which escape through a hole in the anode into a low-pressure region behind it, and a method employing electrostatic focusing and deflexion of the same issuing beam. The following general conclusions have been drawn from the experimental study:

(*a*) At low pressures and high voltages where the discharge is strongly abnormal, the issuing electrons