but from the line joining the dipole to the point of observation. If we take account of this circumstance, we find that the change of the angle of opening becomes

$$\Delta\theta = -\ \alpha\rho \cos L + \rho \sin L\ ;$$

where the first term is the effect due to the change of distance from the dipole and the last term is the new parallactic effect. The coefficient

$$\alpha = \frac{2}{r_0}\left(\frac{1}{r_0} - 1\right)/\cos\theta$$

varies with the energy of the rays. For the rays just able to come from the zenith ($\theta = 0$), it is equal to 4 and its minimum value is $\sqrt{2}$.

For negative particles, the angle of opening of the cone must be taken not from the west but from the east, and therefore the sign of the new term must be inverted. The usual theory is therefore correct only if the rays are a mixture of positive and negative rays in equal amount. This is not the case, as the asymmetry measurements have shown that the positive rays are more important.

If we write $\tan\beta = 1/\alpha$ we get

$$\Delta\theta = \frac{-\rho}{\sin\beta} \cos(L + \beta),$$

showing that the improvement of the theory essentially amounts to reckoning the longitudes from an origin at an angle $\beta$ west of the position of the dipole. This angle $\beta$, which is 0 for rays just able to reach the equator, is 14° for rays of 0·5 Störmer, that is, $15 \times 10^9$ eV. (for protons) and goes up to 35° for the limiting case of $60 \times 10^9$ eV. Although this correction is far from the 60° asked for by Hoerlin, it is in the right direction and will substantially reduce the discrepancy between theory and observation.

The fact that the longitude effect is different according to the effective value of the intensity of the rays and therefore according to the screens used, and also depends on the sign of the charge, will make the analysis more difficult ; but when it is achieved, due to improvement in observations and also to progress in the working out of the details of the theory, it will probably afford information on the sign of the charge and the distribution of the intensity of the rays.

<div align="right">G. Lemaître.</div>

University of Louvain.
    May 22.

[1] NATURE, **139**, 24 (1937).

---

### Crystallization of Lysozyme

THE occurrence in nasal mucosa of a substance capable of lysing certain bacteria was noted by Fleming[1], and this or a similar compound was later obtained from egg-white by Wolff[2] who, however, did not recognize the true chemical nature of the substance. Meyer, Thompson, Palmer and Khorazo[3], adopting an entirely different procedure, showed that lysozyme is a protein giving some of the typical reactions ; they also quoted analytical data.

Dr. E. A. H. Roberts, of the Department of Pathology, has further improved the technique of the preparation and his results will shortly be published in another place. In the meantime we have undertaken the purely chemical side of the investigation of this interesting protein, and we wish to express our gratitude to Dr. Roberts and Prof. Florey for the facilities provided.

The material made according to the method of Roberts seems to possess a high degree of homogeneity and it may be crystallized by one operation from solution in $N/20$ acetic acid and concentration over aqueous potassium hydroxide in a vacuum desiccator. The crystals (Fig. 1, photomicrograph by Mr. H. M. Powell) appear to be dodecahedra, and Miss D. Crowfoot has kindly undertaken their crystallographic examination.

Crystalline lysozyme is about as active as the Roberts specimen in bringing about lysis of *Micrococcus lysodeikticus*, but comparisons by the method used are not capable of great accuracy.
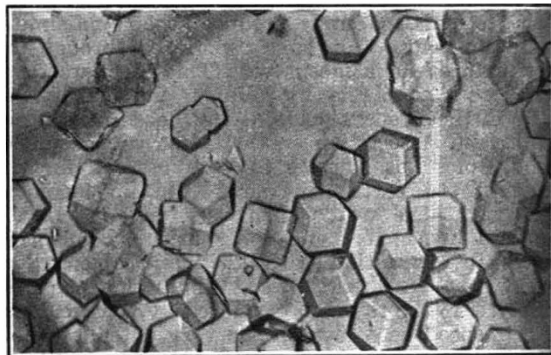


<div align="center">Fig. 1.</div>

Mr. H. S. Philpot has kindly studied the behaviour of lysozyme in the ultracentrifuge, and the molecular weight appears to be of the order of 18,000, a quite provisional estimate.

The ultra-violet absorption shows the usual tyrosine-tryptophan band at about 2770 A. in acid solution ; this is shifted to about 2870 A. in $N/10$ sodium hydroxide solution. Using the method of Holiday[4], analysis of the curves indicates the presence of 4·4 per cent of tyrosine residues and of 2·2 per cent of tryptophan residues in the molecule.

<div align="right">E. P. Abraham.<br>R. Robinson.</div>

Dyson Perrins Laboratory,<br>
    University, Oxford.

[1] Fleming, A., *Proc. Roy. Soc.*, B, **93**, 306 (1922).
[2] Wolff, L. K., *Z. Immunitätsforsch.*, **50**, 88 ; **54**, 188 (1927).
[3] Meyer, K., Thompson, R., Palmer, J. W., and Khorazo, D., *J. Biol. Chem.*, **113**, 303 (1936).
[4] Holiday, E. R., *Biochem. J.*, **30**, 1795 (1936).

---

### Thermal Decomposition of Ethylene Bromide

WHILE we were investigating the behaviour of certain gaseous alkyl and alkylene bromides at high temperatures, with the view of finding out how the energy of activation was related to the zero point energies (or vibration frequencies) of adjacent bonds (for example, tert.-butyl bromide with three C–C bonds might be expected to require a less activation energy than normal butyl bromide with two C–H and one C–C bonds) we found that the homogeneous nature of the decomposition could not always be predicted, and that the calculations made for ethylene bromide ($C_2H_4Br_2$) by Sherman and Sun[1] based on the Eyring method were somewhat misleading.

We used an all-glass pyrex apparatus, with a diaphragm gauge (electrical contact) balanced against a mercury manometer. The decomposition of ethylene