either on resting cells or on those already in the process of division. In our opinion this is a perfectly legitimate index of sensitivity.

We are now studying the effect of gamma irradiation upon the embryonic columnar epithelium of a chick embryo of two days' incubation, in which, as one of us (A. G.) has shown[1], the point in the cycle of division of any cell may be deduced from its form and position within the epithelium. All dividing cells, together with those about to divide, and those which have just divided, are arranged in a layer bordering the lumen. Resting cells (that is, non-dividing cells) are found away from the lumen towards the surrounding mesenchyme. When a resting nucleus is about to divide, it migrates towards the lumen and assumes a streamline form. When it reaches the lumen it becomes globular and then divides. The daughter nuclei retreat away from the lumen, and assume the streamline form in the reverse direction.

In the streamline nuclei approaching the lumen, chromosomes are already beginning to form, and it is this stage to which the term 'pre-mitotic' should be applied. By irradiating suitable embryos *in ovo* or explanted whole *in vitro* we can study the reaction of cells at each stage of the cycle of division to irradiation.

Small doses of irradiation have no effect on resting or on dividing cells, but cause an arrest of the mitotic cycle in premitotic cells in just the same way as we have already demonstrated for cells in tissue cultures; the migration towards the lumen still takes place, but the formation of the chromosomes is inhibited.

A heavy dose causes degeneration throughout the tissue, but always to a greater extent in the pre-mitotic and dividing cells than in the resting cells. The exact distribution and degree of degeneration among cells in these three conditions of activity under different physical conditions have yet to be determined, but we hope shortly to publish our results and thus furnish the details for which Dr. Mottram has asked.

F. G. SPEAR.
A. GLUCKSMANN.
A. F. W. HUGHES.
C. W. WILSON.

Strangeways Research Laboratory,
Hills Road, Cambridge.
Aug. 29.

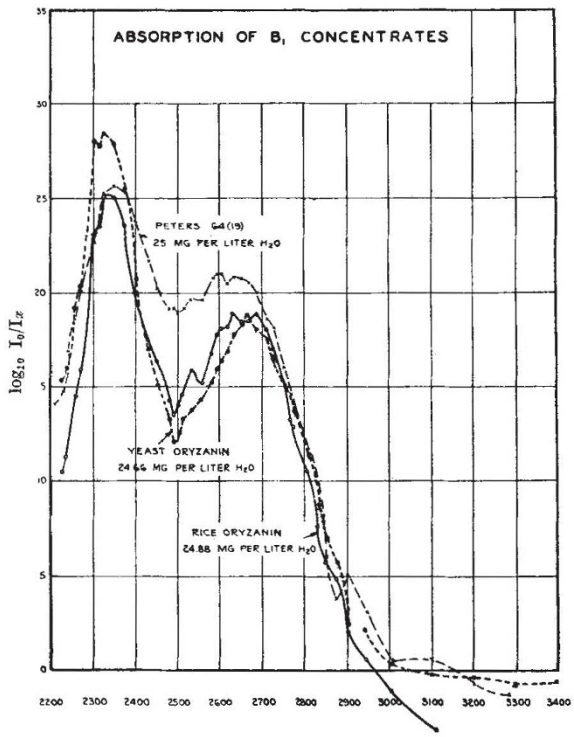
[1] *Z. Anat.*, **93**, 1930.

Chemical Constitution of Vitamin B_1 as deduced from Ultra-Violet Absorption Spectra

IN earlier papers[1], we pointed out the correlation of absorption at 2600 A. with the activity of various B_1 concentrates and the probability that the active material is a purine or pyrimidine derivative as indicated by its apparent absorption maximum at this point[2,3]. The materials discussed in these papers[1] were impure concentrates. Peters and Philpot[4] concluded from studies of crystalline preparations made at Oxford that the maximum characteristic of B_1 is more probably at 2450 A.

Through their kind co-operation, we have been enabled to study during the past year two of Dr. Peters's crystalline preparations, as well as two from Dr. Ohdake, and three prepared by Dr. Seidell, in addition to several made in our own laboratory. The parallel biological and spectrographic assays of these materials again indicate a marked correlation between absorption at or near 2600 A. and biological activity. The absorption curves, some of which are reproduced here (Fig. 1), resemble those of cytosine[3], having maxima at 2650 and 2350 A. and extinction values of the correct order. Lack of correlation between absorption and activity at 2350 A. as well as at 2600 A. in the earlier materials studied was probably due to the presence of end-absorbing impurities in some of the concentrates. The present results indicate that the active material may be built around a pyrimidine of the cytosine type.

On the basis of preliminary experiments, we believe that the discrepancies between our results and those of Peters and Philpot may be explained as effects due to the solvents used. According to his published curve[5], Windaus's crystals gave still different results, having a single maximum at 2600 A. with little absorption in the short-wave region. It is possible



Wave length—Angstroms.

FIG. 1.

to explain this by presuming that more than one of the pyrimidines can form the nucleus of the active molecule—uracil serving in the Windaus crystals, cytosine in the others. Windaus's early formula[5] for his crystals contains one less N (N_3) than the formulæ of van Veen or Ohdake (N_4), which is in agreement with this hypothesis (uracil has N_2, cytosine N_3).

Full details of these results and of investigations of the influence of full and filtered ultra-violet irradiation on B_1 crystals will be published elsewhere.

FRANCIS F. HEYROTH.
JOHN R. LOOFBOUROW.

Basic Science Research Laboratory,
University of Cincinnati.
July 21.

[1] Heyroth and Loofbourow, *Bull. Bas. Sci. Res.*, **3**, 237; 1931. NATURE, **130**, 773, Nov. 19, 1932. *Bull. Bas. Sci. Res.*, **4**, 35; 1932.
[2] Heyroth and Loofbourow, *J. Amer. Chem. Soc.*, **54**, 3441; 1931.
[3] Heyroth and Loofbourow, *J. Amer. Chem. Soc.*, in press.
[4] Peters and Philpot, *Proc. Roy. Soc.*, B, **113**, 48; 1933.
[5] Windaus *et al.*, *Z. physiol. Chem.*, **204**, 123; 1932.