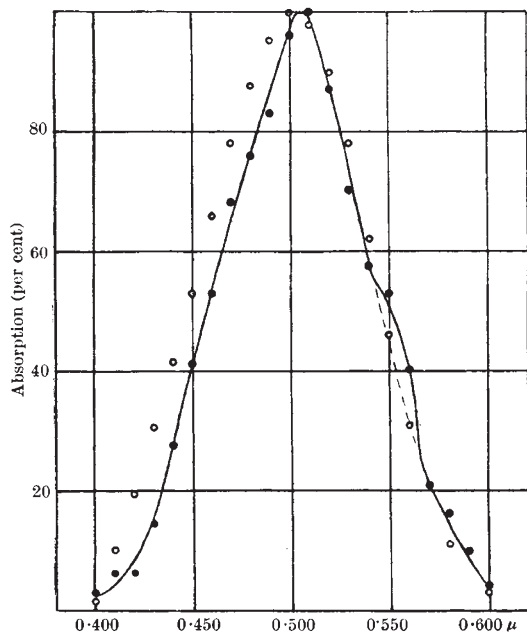


### Absorption Curve for Visual Purple and the Electrical Response of the Frog's Eye

LETTERS in NATURE by Dartnall and Goodeve<sup>1</sup> and by Wald<sup>2</sup> have revived the question concerning the physiological significance of visual purple and visual yellow. Dartnall and Goodeve discuss the scotopic luminosity curve and compare it with the absorption curve for amphibian visual purple, determined by Lythgoe<sup>3</sup>. Attention may perhaps be directed to the fact that the retinal equivalent of the frog's luminosity curve has been measured by Granit and Munsterhjelm<sup>4</sup> with the aid of the electrical response. In this work, 'luminosity' was obtained in terms of the amount of potential in millivolts of the initial positive *b*-deflection of the electroretinogram in response to stimulation with an equal energy spectrum.



We lacked then, and still lack, data showing the relation between amount of potential and energy absorbed (intensity), and therefore had to neglect the area of the curves showing size of *b*-wave against wave-length. However, recent interest in this problem may to some extent be satisfied by a calculation of the frog's 'luminosity' curve, that is, the physiological absorption curve, on the basis of the fact that at low intensities, such as were used by Granit and Munsterhjelm, the *b*-wave according to Chaffee, Bovie and Hampson<sup>5</sup> is proportional to the square root of the intensity. This is a general equation that probably will not hold for all the twenty-seven somewhat differently distributed 'luminosity' curves measured by Granit and Munsterhjelm. But it should be acceptable if their 801 values are averaged together.

Applying the equation of Chaffee *et al.* to the average curve of Granit and Munsterhjelm (their Fig. 7) we obtain the effective intensity from the amount of potential at each wave-length. The effective intensity must be proportional to energy absorbed. Finally, following Dartnall and Goodeve, we correct the absorption curve computed from the electrical responses by multiplying by the value of the quantum at each wave-length. This gives us curve above.

The dots represent the 'physiological' absorption curve, the circles around it Lythgoe's curve for the absorption of visual purple in solution (his Table 1, column 2). Both curves refer to *Rana esculenta*. The hump in our curve between 0.550–0.560  $\mu$  is placed at the maximum of the cone curve of the same species, determined after light adaptation with the same apparatus by Granit and Wrede<sup>6</sup>. It probably signifies that in this region of maximal cone sensitivity some low threshold cones have succeeded in influencing the measurements. However, the main result is obviously that there is a reasonably good fit in the long wave-lengths, but that even the 'corrected' absorption curve for visual purple, used for comparison, is higher in the short wave-lengths.

Dartnall and Goodeve, coming to the same conclusion, prefer Lythgoe's uncorrected values and suggest that the greater absorption by visual purple in the short wave-lengths is due to 'yellow impurities'. Their comparison refers to the human scotopic luminosity curve. This may be the correct explanation of the discrepancy, so far as measurements of electrical responses at low intensities or human absolute thresholds are concerned. But it is an interesting and, perhaps, significant fact that we obtained a hump at about 0.460  $\mu$  when the scotopic eye was stimulated with a brighter spectrum (Granit and Munsterhjelm), and that the otherwise symmetrical cone curve had an 'appendix' of relatively too large responses in the same region (Granit and Wrede). It should be a relatively easy task to determine by means of the electrical responses whether all the yellow substances are internal filters or some perhaps physiologically active photochemical substances.

We hope to be able to publish such measurements in due course.

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<sup>1</sup> Dartnall and Goodeve, NATURE, 139, 409 (1937).

<sup>2</sup> Wald, NATURE, 139, 587 (1937).

<sup>3</sup> Lythgoe, J. Physiol., 89, 331 (1937).

<sup>4</sup> Granit and Munsterhjelm, J. Physiol., 88, 436 (1937).

<sup>5</sup> Chaffee, Bovie and Hampson, J. Amer. Opt. Soc., 7, 1 (1923).

<sup>6</sup> Granit and Wrede, J. Physiol., 89, 239 (1937).

### Effect upon Sex Behaviour of a Diet Deficient in Vitamin E

DIETS deficient in vitamin E produce sterility in the male rat and ultimately extinguish the sex drive<sup>1,2</sup>. Preliminary observations suggested that the behavioural disturbances were not clearly related to, and dependent on, genital degeneration. Extended tests were therefore undertaken on 76 male rats reared on a diet lacking in vitamin E but adequate with respect to vitamins A and D and containing sufficient yeast.

Behaviour differed greatly. In some animals sex behaviour was normal during the first months of the experiment. In others it was disturbed during this period, the abnormalities resembling those described as a result of partial hypophysectomy<sup>3</sup>. In about 25 per cent of the animals no overt sex behaviour was observed at any time. As the experiment progressed, disorganization of sex behaviour took place in those animals which mated during the first stages of the experiment. Both structure and intensity of behaviour were affected; the males mounted but failed to complete the sex act.