the intestine by bile and digestive juices is in progress were stressed, and further parallels drawn between relatively abundant elements such as calcium and magnesium and trace elements such as strontium, tin, cobalt and nickel.

In his final summary of the day's discussion, Prof. C. Harington reviewed a number of the salient features in the light of his own experience of the history of development of the physiology of iodine, stressing the point that although much information on the importance of various trace elements may accumulate, final conviction concerning the significance of any particular one does not really penetrate the scientific consciousness of the community until precise physiological function becomes clear and the actual operative mechanism is biochemically demonstrated.

T. DALLING.
H. H. GREEN.

STAR MAGNITUDES AND IMAGE DIAMETERS IN PHOTOGRAPHIC PHOTOMETRY

FORMULÆ hitherto employed to determine the relationship between star magnitudes and image diameters on photographic plates have been empirical, and fail in certain circumstances. It is impossible to apply them in the case of bright stars which give diameters larger than a certain limiting value (and this value varies with different formulæ) and, in addition, the formulæ take no account of the effect of star colours. D. L. Edwards has described a new method of investigation which gives very satisfactory results (*Mon. Not. Roy. Astro. Soc.*, **102**, 5). The work was carried out at the Norman Lockyer Observatory, Sidmouth. Three different Zeiss triplet lenses were used: (*a*) aperture 14 cm., focal-length 70 cm., (*b*) aperture 10·4 cm., focal-length 50 cm., (*c*) similar to (*b*) but stopped down to 2 cm. aperture. The plates used were the Barnet Super Press (blue sensitive emulsion), and Ilford Hypersensitive Panchromatic, which gives a good scale of photovisual magnitudes without a filter. When the panchromatic plates were considered and measured diameters were plotted against H.D. visual magnitudes (only stars of type *A*0 being used to determine the form of the relation for one colour only) the empirical formula $m=a-b(D-kD^2)$ gave the best fit. In this formula m is the magnitude, D the diameter, and a, b, k are constants.

Measures made on Barnet Super Press plates were treated in the same way, except that photographic instead of photovisual magnitudes were used, and it was found that the above relation held as for the photovisual plates. In addition, the same values of k were also applicable, in spite of the different magnitude scales and of the different types of emulsion used. Good values of k were given by $k=10^{-5}(140-13C)$, where C is the colour index.

The advantage of the first formula given above is that it has a greater range of application to bright stars than earlier formulæ, and it also allows for colour effect.

Edwards has applied this formula to γ Cassiopeiæ. The series of photographs extended over the period June 1, 1940, until March 24, 1942. During 1940 the magnitude variations were more pronounced, but by the end of the year and also throughout 1941 they tended to become steadier. Considerable changes in the spectrum accompanied the more pronounced fluctuations. At, and just preceding, the minima of June 29, 1940, photovisual magnitude 2·76 and photographic magnitude 2·64, and also of September 21, photovisual and photographic magnitude each 2·53, the *H* lines showed well-separated double emission components with strong central absorption and rather faint 'dish-shaped' absorption fringes. The He I absorption lines at 4471, 4026, 3964 were strong and sharp, and O II absorption rather faint. During the rise to maxima at August 24 and October 7, the magnitudes on these dates being $m_{pv}=2\cdot20$, $m_p=2\cdot06$, $m_{pv}=2\cdot05$, $m_p=2\cdot06$ respectively, the *H* central absorption became fainter and the 'dish-shaped' absorption stronger. The He I lines became fainter and more diffuse, OII became a little stronger, and λ 3888 (He I) very strong.

It was found that the colour index changes were subject to considerable uncertainty and did not show such pronounced correlation with spectrum changes as the magnitude variations. The mean colour index over the whole period was −0·12, and corresponds to the average colour index of *B*6 stars. As γ Cassiopeiæ is a *B*2 star, the average colour index of which is −0·30, its average colour index suggests considerable reddening.

ULTRA-SHORT RADIO WAVE PROPAGATION

AT a meeting of the Wireless Section of the Institution of Electrical Engineers on November 4, Dr. R. L. Smith-Rose and Miss A. C. Stickland read a paper describing the results of an analysis of field intensity measurements obtained during the years 1937–39, over the Post Office radio-telephone link between Guernsey and Chaldon, England, on wave-lengths of 5 and 8 m. (frequencies 60 and 37·5 mc./s.). The path between the radio stations was almost entirely over sea and about 85 miles in length, of which some 36 miles were outside the optical range. The material analysed was in the form of continuous, twenty-four hours a day, records of the field intensity received at Chaldon from the transmitters at Guernsey.

A quantitative study of the records confirmed the similarity of the type of signal fading on the two wave-lengths, and the lack of both diurnal and true annual variation; on the other hand, the results suggested a long-term secular variation in which the amount of fading on 5 m. tended to increase to a maximum over the period of observations while that on 8 m. decreased. The period of two years over which the observations were taken was not sufficient, however, to allow of any conclusions being formed as to an explanation of this trend.

Comparison with meteorological data showed a marked correlation between periods of very little fading and the presence of low-pressure systems, while periods of slow fading recurred at times of anticyclonic conditions. This, together with the fact that fading, while always less in winter than in summer, showed no regular seasonal variation, led to the conclusion that the winter decrease was due to the greater prevalence of low-pressure systems during this season.