In fact, apart from numerical factors of order not far different from unity, the theoretical expressions for $R_{max.}$ and M_0 show that

$$\frac{M_0}{M_H} \simeq \gamma_1^{3/2} \sim 10^{-3} \odot, \quad \frac{R_{max.}}{\frac{\hbar}{mc}} \simeq \alpha^{1/2} \gamma_2^{1/2} \sim 0 \cdot 1 \, R_{\circ}, \qquad (2)$$

where $\odot$ is the mass of the sun, $R_{\circ}$ its radius. Further, if M_1 denotes the (Chandrasekhar–Stoner)[3] upper-limit to the mass of the completely degenerate configuration, then again apart from numerical factors

$$M_1/M_H \simeq \gamma_2^{3/2}, \quad . \; . \; . \; . \; . \; . \; . \; . \; . \quad (3)$$

a 'coincidence' which has already been pointed out by Chandrasekhar. It is interesting to see that

$$\frac{M_0}{M_1} \simeq \left(\frac{\gamma_1}{\gamma_2}\right)^{3/2} = \alpha^{3/2} \quad . \; . \; . \; . \; . \; . \quad (4)$$

It will be observed, as has been noted by Chandrasekhar (though in a slightly different form) that if the power of γ_2 be taken not as $\frac{3}{2}$ but $\frac{3}{2} + \frac{1}{4}$ and $\frac{3}{2} + \frac{1}{2}$, it gives (roughly) the order of the number of particles in a galaxy and the 'universe' respectively.

It may be further pointed out that if γ_2 in (2) be similarly given powers of $\frac{1}{2}$, $\frac{1}{2} + \frac{1}{4}$ and $\frac{1}{2} + \frac{1}{2}$, we obtain the order of the maximum radius for a *cold* body (roughly) the radius of a galaxy and the Universe respectively.

The time-dependence of γ_1 and γ_2 according to the ideas of Dirac and Milne will be reflected in a corresponding time-dependence of M_0 and $R_{max.}$ and other astrophysical magnitudes.

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July 9.

[1] Dirac, *Proc. Roy. Soc.*, A, **165**, 199 (1938); Chandrasekhar, NATURE, **139**, 757 (1937); Schrödinger, NATURE, **141**, 410 (1938).

[2] Kothari, *Proc. Roy. Soc.*, *A*, **165**, 486 (1938).

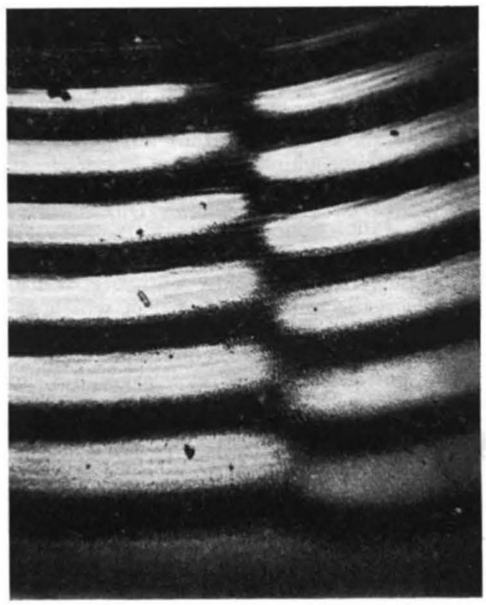
[3] Chandrasekhar, *Mon. Not. Roy. Astro. Soc.*, **91**, 456 (1931).

Interference Patterns with Liesegang Rings

ANYONE who is experimentally familiar with the production of Liesegang rings in gelatine films and other allied phenomena might well feel tempted to believe that such periodical precipitates are to be regarded as wave-patterns. Indeed, several workers in the field appear to have felt that the analogy between the Liesegang phenomenon and a wave-effect is not merely superficial, and have sought for more positive evidence in support of it. Leduc and others, for example, claimed that Huygens' well-known optical principle gives an explanation of the form of the rings observed when a precipitating agent diffuses through a narrow aperture in an obstacle cutting across the film. More recently, some Russian workers[1] have gone further and suggested that the periodic precipitation itself is to be explained in terms of the de Broglie waves associated with the movement of the precipitating agent, and claim to have been able to measure the 'refractive index' of such waves in passing across a boundary separating regions of different concentration of the gelatine.

The distinguishing character of a true wave is the existence of phase relationships, and connected therewith, the possibility of interference effects. In the course of some studies made by us, we have observed some phenomena with Liesegang precipitates which are unmistakably in the nature of interference effects. To make the significance of our results clear, it is necessary to make here a remark regarding the structure of an interference field. When two wave trains crossing at an angle are superposed, we have, of course, regions of maximum and minimum disturbance. If the minimum disturbance is actually zero along a given line, the wave fronts on either side of it show a difference of phase of half a wave. This is an exceedingly characteristic interference effect and can easily be recognized in ripple photographs.

When on a gelatine film containing a very small concentration of sodium chloride a drop of silver nitrate is placed, the Liesegang pattern consisting of thousands of closely spaced rings of silver chloride precipitate may be observed. On an examination of the precipitate, it is often seen that the patterns are not of uniform intensity everywhere, but show lines of minimum and maximum disturbance, and the effects observed are closely analogous in some cases to beats, and in other cases to interferences of the individual waves. In the latter case, the difference of phase of half a wave-length on either side of a line of zero disturbance is invariably to be observed.



INTERFERENCE PHENOMENON OF SILVER CHROMATE RINGS IN GELATIN.

Even more striking are the interferences which we have observed in suitable circumstances with silver chromate rings in gelatine. In this case, the pattern really consists of a great number of fine rings, the intensity of which varies in such manner that they form a succession of widely spaced groups. Not only the individual waves, but also the groups, show interference phenomena with the characteristic discontinuity of phase of the group on either side of a line of zero disturbance. The accompanying photograph shows this in a striking way.

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July 13.

[1] Nikiforov and Kharmonenko, *Acta Physicochemica U.R.S.S.*, **8**, 95 (1938).