

We have had periods on which the  $F_1$  ray is predominantly right-handed and periods when  $F_1$  is the opposite, and again periods when  $F_1$  alternates between right-hand and left-hand with periods of plane polarisation in between. So far as a rather limited set of observations goes, during the daytime  $F_1'$  and  $F_1''$ , the right- and left-hand circularly polarised echoes respectively, appear on the average to be of the same order of strength.  $F_2$  and  $F_3$  are, however, predominantly left-handed although right-handed  $F_2$  and  $F_3$  have occasionally been observed. The wave-length used throughout these experiments was 60 m. and the base line between transmitter and receiver was 1.2 km.

It may be of interest to note that we have been able to get echoes from a neighbouring transmitter about 50 yards from the receiver which only radiated between 0.1 and 1 watt; the received intensities varied between a fraction of a microvolt/m. and about 20  $\mu$ v./m.

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#### Acceleration of the Decomposition of Crystals of Barium Azide by the Emission from Radium Emanation

DEHYDRATED crystals of barium azide decompose at a measurable rate above 100° C. giving nitrogen as a gaseous product. There is an induction period very similar to that observed with mercury fulminate and the reaction spreads from centres of metallic barium formed on the surface and in the interior of the crystal (F. E. Harvey, unpublished). The induction period is shortened and the rate of centre formation increased if the crystals are exposed to the emission from a platinum seed containing radium emanation. At 110° C., the induction period is shortened from 120 min. to 55 min. and the rate of acceleration of the reaction trebled when the intensity of the emission from the emanation seed is about 1 m. curie.

The experiments so far carried out indicate that the acceleration of the reaction is due to an increased rate of nuclear formation. From the nuclei of metallic barium formed, the reaction spreads out at a rate which is about three times greater than for nuclei formed by thermal means.

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#### Crystal Structure of Diphenyl Series

A COMPARISON of the results of crystal structure analyses of diphenyl, *p*-diphenylbenzene and *p*-diphenyldiphenyl gives evidence that in this series of compounds the benzene rings in each molecule are coplanar and linearly extended. The three substances crystallise in structures of  $P 2_1/a$  symmetry with unit cells which are nearly identical in the *a* and *b* directions and have the respective lengths of 9.50, 13.59 and 17.72 Å. along the *c* axis. From the marked similarity not only in dimensions but also in the intensity of those reflections which are less dependent on the length of the molecule, it is apparent that there is a similarity of structure and that in each case the length of the molecule is roughly parallel to the *c* axis.

The orientation of the benzene rings in the diphenyl crystal was determined by Krishnan from magnetic susceptibility measurements and confirmed by Dhar in an X-ray study. The molecule was found to be planar and its position in the unit cell was defined. The structure of *p*-diphenylbenzene has now been determined in this Laboratory and a Fourier analysis will shortly be published. The results show that the molecule is extended in a single plane at a tilt to the axes which, though not identical with that in the above case, does involve a similar alignment of the molecules with respect to each other. Preliminary results from the study of *p*-diphenyldiphenyl indicate that a corresponding arrangement exists in this case. I should very much like to hear of higher compounds of this series which would be available for study.

A comparison of the optical properties of these compounds is of interest. In all three substances the optic axes lie in the 010 plane and one optic axis is in the field when viewed along the perpendicular to the 001 face. In each case the ray vibrating in the direction most nearly parallel to the length of the molecule is the slow ray. The three compounds are optically positive and the degree of curvature of the isogyre shows that they become increasingly positive as the molecule lengthens. This is to be expected, since, with an increasing number of phenyl groups, the chain character of the molecule becomes relatively more important than its planar character, especially as the molecules are parallel as regards their length but have their planes mutually inclined at an angle of approximately 66°. It is proposed to carry on a more detailed study of the optical and magnetic properties of the series in this Laboratory.

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#### Strange Spatfall of the Common Mussel on the Common Cockle

AN interesting and unusual spatfall of the common mussel, *Mytilus edulis*, on the common cockle, *Cardium edule*, resulting in a related and dual mortality was observed in 1932 in the course of investigations on the extensive cockle beds of Cark sands at the head of Morecambe Bay. In June, heavy falls of mussel spat (5–10 mm. long) were found in several large areas on these beds, an event unprecedented in the experience of local middle-aged fishermen. At low water on these desert-like sands, the areas with mussels loomed in the distance like rocky outcrops. Such an unusual spatfall may be regarded as a natural experiment on the part of *Mytilus* to establish itself on sandy ground.

The spat had settled about and below half-tide mark actually on living cockles, which were so abundant in parts as to push one another to the surface of the sand. The fishermen were commonly taking 1 cwt. of cockles (mean length about 30 mm.) from about 10 square yards of ground at the lower levels (about 45 individuals per square foot). An important bionomic feature of these grounds is that, wherever examined, the sand was found to contain but little silt and to pass wholly through a sieve with 0.5 mm. circular holes. In November one of these areas was again visited and examined. It was found to be littered predominantly with clumps of dead cockles lying on the surface of the sand and held together by the byssus threads of recently existing