To test the theory for the longer wave-lengths the following conditions are necessary:

(*a*) The wave-length must be sufficiently removed from the magneto-ionic critical wave-length, so that the extraordinary wave is not too strongly absorbed. This necessitates the use of a wave-length greater than 400 m.

(*b*) To investigate the relative penetrating powers of the two magneto-ionic components, it is necessary to work at a time when the ionisation density in one of the ionospheric regions is small enough to permit at least one component to penetrate. This occurs only with the E region, and then only at midnight in midwinter.

During January and February of this year we have made experiments to compare the behaviour of waves of length greater than 214 m. with the well-known behaviour on shorter wave-lengths. Pulse transmissions of the Breit and Tuve type were provided from a nearby transmitter and the wave-length could be varied within the range from 400 metres to 500 metres. The receiver was equipped with a circularly polarised aerial so that the polarisation of the received echoes could be investigated. The values of the equivalent height, the state of polarisation, and the relative intensity of the two component waves were all determined for a series of different wave-lengths.

The results of the experiments were as follows:

(*a*) For wave-lengths greater than 214 metres the right-handed (extraordinary) component penetrates the E region more easily than the left-handed, so that it may be reflected from the F region while the left-handed component is reflected from the E region. This is the opposite of what happens on the shorter waves and is in accordance with the theory.

(*b*) The fact that the extraordinary component is reflected at all means that in the reflecting regions the quasi-transverse approximation to the magneto-ionic equations must hold, that is,

$$\frac{y_T^4}{4y_L^2} > z^2 + (1 - x)^2,$$

using the nomenclature of reference 1.

(*c*) For wave-lengths which just penetrate the E region, the F region echo is split, with the extraordinary component uppermost. This may be due to differences in the group velocities of the two components in the E region or in an intermediate region.

(*d*) On several occasions there was evidence of reflection from an intermediate region at an equivalent height of about 150 km.

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[1] Appleton, *J. Inst. Elec. Eng.*, **71**, 624; 1932.
[2] Appleton, *Proc. Phys. Soc.*, **45**, 208; 1933.
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Detonation of Nitrogen Iodide, $NI_3.NH_3$

WHEN moist nitrogen iodide is suspended in air over phosphorus pentoxide in a glass vessel and the vessel evacuated by a mercury vapour pump, the crystals detonate as soon as they become dry. On the other hand, the substance can be completely decomposed into iodine and permanent gases without detonation occurring if the pressure of the permanent gases be not allowed to fall below 2×10^{-3} cm. At room temperature the decomposition can be completed in 12–24 hours. On carrying out the decomposition at $-20°$ C. there is little reaction until the water is removed, after which the pressure rises linearly for a time. As iodine begins to condense out on the walls of the glass vessel, the rate of evolution of gas decreases and ultimately the pressure reaches a constant value, although some nitrogen iodide is still undecomposed. After this steady state is reached, on subjecting the residue to a hard vacuum it detonates. On detonation, the amount of permanent gas produced is only 30–50 per cent of that liberated during the thermal decomposition.

The thermal reaction is retarded by the easily condensible products of decomposition and also by water, and on removal of these substances, nitrogen iodide detonates spontaneously. This accounts for its extreme sensitivity to a blow, for this will create fresh surfaces which are unstable. The solid reaction gives rise to reaction chains which are infinite in length when the surface is free from adsorbed gases.

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A Further Reappearance of the Second Red-Eye Mutation in *Gammarus*

THROUGH the kindness of Mrs. Sexton, of the Marine Biological Laboratory, Plymouth, I was able to obtain a stock of a new mutation producing red, instead of the normal black, facets in the eyes of the amphipod *Gammarus chevreuxi*, Sexton. It had appeared in the first F_2 of a pair from a dredging taken in Chelson Meadows, near Plymouth, about a year ago, and my intention was to make a study of the effects of temperature on this mutant similar to that made by E. B. Ford and J. S. Huxley (1927) on the first red-eye mutation. For this purpose it was necessary to cross the new form with the red-eye mutations which had previously appeared, in order to determine whether or not it was homologous with any of them.

The following results have now been obtained: When crossed with the first red-eye stock (r_1), all the F_1 offspring had black eyes. With the second red-eye stock (r_2), the following F_1 families have appeared: (*a*) One black- and sixteen red-eyed young. (*b*) With different parents: a single red-eyed specimen, about six weeks after mating. (*c*) With different parents again: three red-eyed young about a fortnight after mating, and a further seven red-eyed ones about three weeks later.

Doubtless the explanation of the single black-eyed individual in the first family obtained with the second red-eye stock, is that some of the sperms from the previous mate of the female had remained behind and fertilised one or more of the eggs, causing the appearance of a heterozygous black-eyed specimen—not an unusual phenomenon in *Gammarus*. The long period elapsing between the separation of the female and the appearance of the young precludes such an occurrence in the second brood, while in the last instance, the female, after producing the first red-eyed family, had been mated with a homozygous black-eyed male before being again given a red-eyed mate, so that if any sperm had been left over from a previous mating some of the second family would have had black eyes ('black' is dominant to 'red'). The present gene therefore proves to be a reappearance of the second red-eye factor.