Selwood's remark about the difficulty of explaining the increase of susceptibility observed in didymium nitrate as due to a temporary breakdown of l-coupling is justified. We ought to have mentioned specially that our theory applies only to ions of the iron group.

The writing of this letter was delayed due to the absence of one of us in Europe.

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[1] NATURE, 131, 761, May 27, 1933.

Modulation of Very Short Radio Waves by Means of Ionised Gas

ION densities of he order of 10^{11} ions/cm.^{3}, such as occur in gases in glow discharges under the usual conditions, are of the correct magnitude to affect very considerably the index of refraction and absorption of these media for ultra-short radio waves. It has been found that the intensity of a beam of radiation of wave-length 9·5 cm. can be easily modulated by causing it to traverse such an ionised gas in which the ion density is caused to vary.

A glow discharge tube of dimensions equal to several wave-lengths was used to provide the ionised medium. It was connected to a direct current supply in series with an audio frequency voltage. The D.C. supply was used to maintain the discharge at the required level and the audio frequency to provide the variations of ion density for modulation purposes. This tube was placed in the radio beam between the transmitter and receiver while music or speech modulation were impressed on it. The fidelity of the sound thus received was, as closely as could be noted by the ear, a good replica of the output of the audio amplifier which was impressed on the ionic modulator.

Modulation was obtained also by causing the beam to be reflected from an approximately flat surface built up of glow discharge tubes in the form of concentric rings. However, the degree of modulation was not as great in this case as when the beam was made to traverse the ionised medium. It appears that the modulation is due principally to absorption, although reflection, scattering and refraction also play a part.

This method of modulation yields more pure amplitude modulation than does direct modulation of the oscillator, since the frequencies of ultra-short wave generators, such as Barkhausen-Kurz tubes and magnetrons, are quite susceptible to variations in the applied voltages.

The oscillator used in this work consisted of a small split-anode magnetron, the split anode being 4 mm. in diameter and 7 mm. in length. The receiver was a crystal detector coupled to an audio amplifier. Parabolic reflectors were used with both transmitter and receiver.

Further details will be given in other publications.

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Radiation and Ionisation produced by High Energy Electrons

ON the basis of Dirac's theory, Heitler and Sauter[1] have calculated the probability that high energy electrons in their passage through matter emit a quantum of energy comparable to their own. These results, as they recognise, are in contradiction to the measurements of Anderson[2] and Blackett and Occhialini[3] on the energy losses of high energy particles. The rate of ionisation of a gas by an electron as calculated from Dirac's theory agrees closely, however, with the experimental results.

These results indicate either that Dirac's equation cannot be applied to high energy particles or that the structure of the nucleus, finite size and finite potential within its boundary, plays a role. The rate of ionisation is independent of the potential within the nucleus, whereas the probability of radiation for high energy electrons is d creased in the ratio of the value of the potential within the nucleus to the energy of the electron expressed in equivalent units. The finite size plays no part until the energy is such that the waves scattered from the different parts of the nucleus can interfere. With this correction to the nuclear model, Dirac's theory gives results which are in harmony with the experimental evidence, and thus seems to be applicable to processes which occur outside the limited region of the nucleus. These calculations, which were made by the Born method of successive approximations, were carried to a first order.

This decrease in the rate of radiation by high energy electrons, compared to that calculated on the assumption of a Coulomb field for the nucleus, is accompanied by a corre ponding decrease in the rate of production of pairs, electron and positron.

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Jan. 8.

[1] NATURE, 132, 892, Dec. 9, 1933
[2] *Phys. Rev.*, 44, 406; 1933.
[3] *Proc. Roy. Soc.*, A, 139, 699; 1933.

The Term 'Mesolithic'

FOR many years it was the custom to regard the line of separation of the Palæolithic and Neolithic periods as roughly corresponding to the geological division between the Pleistocene and Holocene; and even Mr. Peake's excellent historical summary (NATURE, Jan. 20, p. 104) does not make it clear why this position was ever abandoned. It is unsatisfactory, and a source of confusion, that the term 'Neolithic' should be used in a broad sense by one generation, and in a very narrow one by the next—that in one case it covers several thousand years in many different lands, while in the other it varies enormously in length in different countries, and in England (where the term originated) it is whittled down to a few decades, with some risk of complete disappearance.

Of course, no one questions that the cultures of Tardenois, Maglemose, etc., are very distinct from that of the 'Age of Polished Stone'; but that could easily have been overcome by a division into Early and Late Neolithic, or, for those who are not happy without new names, into 'Mesolithic' and 'Metalithic' periods. We could then have gone on applying 'Neolithic' in a comprehensive sense to submerged forests, the lower strata of Tilbury and other docks,