mission the resources of Egypt were not equal to finding the money. In these circumstances, English enterprise came to the rescue. Sir Ernest Cassel, backed by a financial syndicate, undertook to find the money and Sir John Aird contracted to carry out the work. The capital fund is to be repaid by instalments of 166,000*l.* extending over thirty years, and it is anticipated that the irrigation will produce a revenue of 400,000*l.* a year. Sir Benjamin Baker has been the consulting engineer, and the work was carried out under the direction of Mr. Fitzmaurice, lately appointed engineer of the London County Council. The dam has thus been entirely carried out by English enterprise and English capital.

THE VELOCITY OF PROPAGATION OF X-RAYS.

M. R. BLONDLOT has recently made an experimental determination of the velocity of propagation of X-rays, as a result of which he finds that they travel with the same velocity as light. The full account of the work is published in the *Comptes rendus* for October 27 and November 3 and 10 (vol. cxxxv. pp. 666, 721 and 763), and a translation of the first two papers is given in the *Electrician* for November 21. As the subject is one of great importance, the following brief abstract of the methods used and the results obtained may be of interest to the readers of NATURE.

The method is based on a principle similar to that of Römer's method of determining the velocity of light. The arrangement of the apparatus is shown diagrammatically in Fig. 1. B and B′

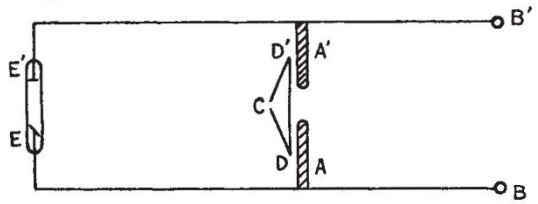

FIG. 1.—Diagram of M. Blondlot's apparatus.

represent the terminals of the secondary of an induction coil which are connected to the poles A, A′ of a Hertz radiator and to the electrodes E, E′ of an X-ray tube. Beneath the Hertz radiator is placed a resonator consisting of a copper wire folded into the shape of a triangle DD′C. The spark gap, C, of this resonator is so placed that it receives the X-rays from the focus tube, but is protected from all other radiation by screens of black paper and an aluminium plate. The oscillator AA′ consists of two brass cylinders arranged horizontally in a bottle of vaseline oil. By suitably altering the length of the spark gap, the oscillator and the focus tube can be made to work simultaneously. The action is then as follows:—At each current of break, the potential between E and E′ rises sufficiently for the X-ray tube to respond. As the potential continues to rise, a spark passes in the oscillator, and this, withdrawing energy from the focus tube, extinguishes it. By careful adjustment, the spark potential of the exciter can be made only slightly greater than the potential necessary to work the tube, in which case the tube will be extinguished very soon after the beginning of the oscillatory discharge, at the end of a time less than a quarter of the period of the radiator. The electric force at the resonator gap only reaches its maximum after a time equal to half the period of the oscillator; hence if the X-ray tube is close to the gap, the X-rays having been extinguished prior to this, there can be no action of the tube on the secondary spark. This conclusion is verified by interposing a sheet of lead between tube and gap, when it is found that the spark is not affected.

Now let the focus tube be kept in the same position and the wires AE and A′E′ be lengthened each by the same amount. This has the effect of delaying the extinction of the tube by the time required for the Hertzian waves to traverse this extra length of wire, and consequently the disappearance of the X-rays at the spark gap C is delayed by the same amount. The X-rays can, therefore, act upon the spark, and that they do so is shown by the fact that the interposition of a lead sheet now makes the spark less bright. If, on the other hand, the wires AE and A′E′ are kept of constant length and the tube moved farther away from the gap, then the X-rays will experience a retardation equal to the time they take to travel from the tube to the gap. The effect of moving the tube farther off should, therefore, be the same as that of lengthening the wires, and this is again confirmed by experiment; the spark grows brighter as the tube is moved away, but if a lead sheet be interposed, the brightness is unaffected by moving the tube. For a certain distance between tube and gap, the X-rays will have at the gap their full intensity during the whole of the time the potential at the gap has an appreciable value; at this point their effect is a maximum, for increasing the distance diminishes their intensity without increasing the time during which they and the electric force act together at the gap. This position of maximum can be found by experiment.

Let v and v′ be the rates of propagation in centimetres per second of the Hertzian waves and the X-rays respectively, and after determining the position of the tube giving the maximum spark when the connecting wires AE and A′E′ are of given length, let these wires be lengthened by α cm. The cessation of X-rays at the gap is thus retarded by α/v seconds. In order to re-establish the coincidence of the times and to find the new maximum, the tube must be moved nearer to the gap by a length β cm., such that $\beta/v' = \alpha/v$. The experiment gives β/α, and therefore v'/v. The following table gives the results of a series of experiments, the first column giving the values of α, the second and third columns the values of β as determined by M. Blondlot himself and his assistant, M. Virtz, respectively, and the fourth column the mean of these two values. Each of the numbers in columns 2 and 3 is the mean of five determinations.

α	β		
	Blondlot.	Virtz.	Mean.
− 7	− 5·9	− 6·5	− 6·2
9	10·5	8·9	9·7
12·5	12	12·6	12·3
15	15·1	14·5	14·8
25	25·3	24·5	24·9
30	31	30	30·5
40	39·3	39·6	39·4
25	24·6	23·2	23·9

The mean result of all the experiments in this and other series gives the value 0·97 for the ratio v'/v.

A variation of the method was also tried in which the ends of the resonator were separated by 0·3 cm., and two wires soldered to them and connected to a micrometer spark gap. These wires were bent back on themselves so as to bring the new gap into the same position as the old one. The Hertz waves have to traverse these wires before producing the spark, and if each wire is lengthened by a cm., the spark is retarded by a/v seconds. To obtain the new maximum, the tube must be moved away from the gap by a distance b cm. such that $b/v' = a/v$. A number of very concordant experiments by this method gave a mean value 0·93 for the ratio v'/v.

The final result of all the experiments, therefore, leads to the conclusion that *the velocity of propagation of X-rays is equal to that of Hertzian waves or of light through the air.* M. Blondlot concludes his papers by pointing out that this conclusion is in harmony either with the hypothesis that X-rays are radiations of very short wave-length or with that of E. Wiechert and Sir George Stokes, that they are electromagnetic impulses produced by the impact between the molecules or electrons in the kathode stream and the antikathode. The fact brought out by these experiments that the X-rays cease simultaneously with the current traversing the Crookes' tube, also supports the latter hypothesis. MAURICE SOLOMON.

RECENT DIETARY STUDIES.

THE character of the daily menu is influenced by various considerations, but it will be universally conceded that the idiosyncrasies of the palate play the predominant part, and to suggest to the ordinary housekeeper that scientific principles should be allowed a voice in the determination of our diet would be simply to court ridicule, for of all departments of the household the kitchen is probably the most conservative in its customs and the most dominated by habit and tradition. It will not be