

DR. L. DE LAUNAY, in the issue of *La Nature* for May 18, describes the efforts of a French company to cultivate the eucalyptus and pine on a large scale in the Peñarroya district of Spain (on the borders of Córdoba and Ciudad Real) for the production of paper-pulp. At first the geological conditions of this region were not considered favourable for intensive afforestation, but experiment showed that the two woods mentioned would yield satisfactory results under proper treatment. The results are justifying expectations, and it is hoped that the once barren region will in a few years repay the time and money spent in developing it. The wood will be used for pulping, pit-props (there are mines near), and for the distillation of acetic acid, etc.

FROM a copy we have received of Prof. Righi's paper on the ionisation produced by X-rays in a magnetic field, which appeared recently in the *Annales de Physique*, it is evident that the presence of a magnetic field has an influence on the process of ionisation of gas molecules not taken into account in previous descriptions of the process. If two horizontal plates are maintained at a difference of potential in a rarefied gas through which X-rays are passing, and the electric current between the plates is measured, we get the well-known relation between the current and the applied potential. If a horizontal magnetic field is superposed on the electric field between the plates, we should expect the deflection of the electrons produced by the field to diminish the current between the plates. This Righi finds to be the case for fields of 1000 gauss, but for fields of 300 or 400 gauss he finds the current is increased slightly by the presence of the field. He ascribes this effect to the electron placing itself so that its orbit is perpendicular to the field. The force of the field on it then being centrifugal, there is an increased tendency for ionisation to occur in the gas.

THE *British Journal of Photography* in its issue of May 5 directs attention to the numerous openings for improvements in optical apparatus as at present constructed, and advises manufacturers to employ experts to examine and improve their designs. As examples, it suggests the provision of two shallow saw-cuts at opposite ends of a diameter of each bezel ring used in a lens mount, so that by placing the edge of a steel rule in the cuts the ring can be easily removed. For lantern condensers the fine threaded screw method of mounting should be given up and replaced by the bayonet catch, or, better, by a stiff spring ring inside the mount holding the front lens against a loosely fitting separating ring, which in turn holds the back lens against a flange on the inside of the mount at the lantern end. Holes should be provided in the mount to allow any condensed moisture to get away. The condenser should be mounted in a cradle, which will allow of its insertion and removal when the lantern is in use without its being necessary to remove the lamp and withdraw the condenser through the body of the lantern, as is so often the case.

PROF. E. W. MARCHANT read an interesting paper on "Some Transient Phenomena in Electrical Supply Systems" to the Institution of Electrical Engineers on May 24. The experiments were made with the help of an oscillograph at the electrical station and substations of the Liverpool Corporation. Prof. Marchant investigated the "current-rushes" on switching transformers into the circuit. The results obtained bear out the conclusions which Prof. Fleming arrived at in the experiments he carried out twenty-five years ago at the Deptford power-station of the London Electric Supply Corporation, which was the first high-tension

supply station in the world. Prof. Fleming's apparatus was, naturally, more primitive, but with the help of vacuum tubes and improvised electrical stethoscopes he detected all the main phenomena. We were specially interested in Prof. Marchant's oscillograms, showing the rush of current which ensues when an induction motor is switched into a circuit, as they prove that, although the initial rush of current may be the same whether the machines be carefully synchronised or not at the moment of switching in, yet the current diminishes to its steady value much more rapidly in the former case. The latter part of the paper on the current-surges which occur when putting alternators in parallel, and the transient currents which ensue on switching on and off high-tension cables, although containing little that is novel, gives excellent illustrations of the substantial accuracy of the ordinary differential equations used by engineers.

OUR ASTRONOMICAL COLUMN.

EARLY HISTORY OF THE SOLAR SYSTEM.—An important contribution to the mathematical investigation of the evolution of the solar system has been made by Dr. Harold Jeffreys in a communication to the Royal Astronomical Society (*Monthly Notices*, vol. lxxviii., p. 424). It is first shown to be improbable that the planets were formed by the gradual condensation of a gaseous mass, and it would seem that they were strongly condensed from the beginning, and were formed catastrophically. The tidal theory is therefore adopted, according to which a star of mass several times greater than that of the sun approached it so closely that the tidal action resulted in the extrusion of one or two streams of matter having a considerable velocity. These streams would break up almost at once into a series of fluid masses, and the gaseous matter set free in the initial disruption would form a resisting medium, the effect of which would be to reduce the eccentricities of the original orbits. From the rate of change of eccentricity it is provisionally estimated that the age of the solar system is 3×10^9 years, which is in general agreement with the age derived by radio-active methods. Among other results of interest it is shown that all the bodies having diameters less than 1000 km., if assumed to be composed of silica, must have been liquid or solid from the beginning, as smaller masses could not have been held together by their own gravitation when in the gaseous state. Dr. Jeffreys considers that the asteroids were probably formed from a primitive planet which approached Jupiter so closely as to be broken up by tidal action.

STELLAR INVESTIGATIONS AT MOUNT WILSON.—In the *Journal des Observateurs*, vol. ii., No. 6, Mr. W. S. Adams gives a brief account of the more general stellar investigations which have recently been carried on at Mount Wilson Observatory. Following an explanation of the spectroscopic method of determining stellar parallaxes, it is stated that the method has now been applied to more than a thousand stars; and that the precision of the results appears to be of the same order as that of parallaxes measured directly. In regard to stellar motions, space velocity appears to be mainly a function of absolute magnitude, the fainter stars moving more rapidly than the brighter, probably to some extent on account of difference in mass, the less massive stars having the greater velocities. A recomputation of the constants of the solar motion gives the position of the sun's apex as R.A. 270.9° , decl. $+29.2^\circ$, and velocity 21.48 km. The investigations of stream motion furnish considerable support to the view that the stars show a motion of revolution around the centre of the galaxy, and that

stream motion is mainly a local effect of this revolution. Studies of star clusters and of the comparative spectra of near and distant stars have indicated that the amount of absorption or scattering of light in space must be extremely small. The 60-in. reflector has been used to establish magnitude scales over a wide range, the faintest stars included being of photographic magnitude 20.1.

SPECTRA OF CHROMOSPHERE AND CORONA.—The results of measurements of a plate obtained at Vavau, Tonga Islands, during the total eclipse of the sun of April 28, 1911, have recently been given by the Rev. Father A. L. Cortie, S.J. (Monthly Notices, R.A.S., vol. lxxviii., p. 441). The photograph was taken with a prismatic camera under somewhat unfavourable conditions, but it extends far into the red, and twenty-five chromospheric lines not previously recorded have been found between λ 6600 and λ 7640. The majority of these are probably due to iron, but there is a fairly strong line at λ 6941, which remains unidentified. There are indications of a new coronal radiation about λ 7150, which is possibly related to the previously known line at λ 5535.8, in agreement with the theoretical investigations of Prof. Nicholson.

THE METRIC SYSTEM AND DECIMAL COINAGE.

NOTWITHSTANDING the growing demand in this country for our adoption of the metric system of weights and measures and a decimal system of coinage, the Committee on Commercial and Industrial Policy after the War has reported against the early introduction of both these overdue reforms. It is proposed in the following commentary upon the Committee's recently issued report (Cd. 9035, chaps. x. and xi.) to show that the arguments upon which these decisions are based are open to considerable criticism. For ease in reference these comments generally follow the sequence of the report.

The Metric System.

The Result of the Permissive Act of 1897.—In its historical review of the previous efforts to establish the metric system in this country, the Committee states that, although the use of the metric system has been permissive for the last twenty years, the number of metric weights and measures presented annually for verification and stamping is now only about 1 per cent. of the number of Imperial weights and measures similarly presented. The Committee has apparently failed to realise that the Act of 1897 alone could not possibly extend our use of the metric system, because, for example, it is obviously impracticable for tradespeople to have two different sets of weights—in different systems—in concurrent use on their shop-counters. It is also unreasonable to expect British manufacturers to employ the metric system in their workshops so long as our railways are permitted to refuse consignments of their products unless the Imperial equivalents of the weights and dimensions are also stated.

Further evidence of the futility of this Act as a measure for encouraging the use of the metric system in this country is unconsciously supplied by the Committee itself in its statement that even our present limited use "appears to arise mainly in connection with the recent legislation of metric carat weights and the adoption in the British Pharmacopœia of metric weights and measures for the prescription of doses." The 1897 Act has thus proved a dead letter, and further legislation is already long overdue.

As in the case of the daylight-saving scheme, the

community as a whole cannot enjoy the benefits of the metric system until its use is established by law.

The Difficulty of Spare Parts and Renewals of Machinery.—The report states that, in order to enable the British machinery-maker to supply spare parts and renewals, it would be necessary for him to continue the Imperial system in use, side by side with the metric system, for possibly a generation after our official abandonment of the Imperial system, and that he would accordingly be required to work in two systems for that period.

This objection evidently arises from an unwarrantable assumption that our adoption of the metric system would necessarily involve altered dimensions of machine parts. Such is not the case, because obviously any dimensions now expressed in inches and parts thereof can be readily expressed in millimetres and parts thereof. It should be remembered that a tolerance of one-hundredth part of a millimetre demands much more accurate work than is usually obtainable in our machine-shops; so that those opponents of metric measures who claim that metric equivalents of Imperial dimensions can be shown only by employing six figures or so after the decimal point are obviously drawing on their imagination and appealing to the credulity of those whose support they seek.

British manufacturing engineers have for years worked in mils (0.001 in.), and the worst the metric system could demand of them, viz. 0.01 mm., would thus represent a saving of one figure in written dimensions. In practice, for small dimensions, two or more figures would generally be saved, because the dimension 0.1 mm. (roughly four mils, or 0.004 in.) would be quite fine enough for most of their work. Equivalents expressed even so approximately as the nearest whole millimetre—thus dispensing entirely with the decimal point—could not differ from the original Imperial dimension by more than one-fiftieth part of an inch.

Furthermore, the passage of an Act requiring all sales to be made in terms of the metric system would not affect the liberty of any person to continue his use of the existing weights and measures for manufacturing purposes until such time as he himself chose to abandon them. All existing patterns could thus be employed for the full term of their useful lives, and when in the normal course they became worn out or obsolete in design they could be economically replaced by new ones based on the metric system.

Manufacturers engaging in new industries should, at the outset, base their designs on the metric system, and it is gratifying to note that this has been done, for example, in the case of the British magneto industry, which has been so successfully established in this country since the outbreak of the war.

The Value of a Universal Language of Quantity.—Regarding the point raised by the Committee that if we now adopted the metric system we should be required to work in two systems for a generation, it may be remarked that, even were this true, it would be much less appalling than our alternative prospect of employing two systems for all time. The fact remains that, whether we like it or not, we already find ourselves obliged to use the metric system to an ever-increasing extent in scientific work, in manufacture, and in export trade; and the retention of our own Imperial system thus handicaps us by compelling us to employ two systems where one would suffice.

When we realise that our national existence depends upon our ability to sell British manufactured goods to all nations, i.e. to develop a world-wide trade, it is obvious that Great Britain—more than any other country—would benefit from the establishment of a universal system of weights and measures.