

a period of transition in which traditional culture must suffer modification, has suggested lines on which development will bring about the least dislocation and can most effectively be brought under an enlightened control.

#### Petrol from Coal

THOSE who have maintained that the successful production of petrol from coal would prove of incalculable benefit to our long languishing coal industry will derive much satisfaction from a reply given in the House of Commons on May 17. Mr. Mitcheson asked the Secretary for Mines if he could furnish an estimate of the increased consumption of coal in Great Britain which has resulted from the imposition of a duty on fuel oil. The Secretary for Mines (Mr. Ernest Brown), in reply, said: "Official information is not available. But a short time ago I received a deputation from the Coal Utilisation Council and other bodies, which furnished detailed information, collected by various trade organisations. This showed that, in terms of coal, there had been conversions from oil to coal and coal products, and business retained which it was stated would, but for the tax, have been lost to home produced fuels, representing an annual rate of consumption of over 600,000 tons."

#### Sexual Selection in the Pheasant

THE Zoological Society of London has just received a noteworthy addition to its Gardens in a pair of Rheinhardt's Argus pheasants (*Rheinhardtius ocellata*), for this is one of the rarest of the pheasant tribe. Those who are interested in problems of sexual selection will find these birds well worth thoughtful study, for they present a striking contrast with the commoner and better known Argus pheasant (*Argusianus*). This bird occupied a prominent place in Darwin's "Descent of Man", on account of the enormous development of the secondary wing-feathers, the like of which is seen in no other bird. These feathers are also remarkable for their ornamentation, which consists of a series of ocelli which, as Darwin pointed out, when they are displayed in the courtship attitude, look like a series of balls lying within a cup-shaped socket, while the primaries are marked by a pattern of indescribable beauty. The wings of Rheinhardt's pheasant lack any form of ornament, and in shape conform to the usual type of pheasant wing. The tail feathers, however, are prodigiously long and marked by a pattern of considerable beauty. This striking difference in the secondary sexual characters in these two birds is puzzling. Nothing seems to be known of the nature of the display of *Rheinhardtius* in its amorous moods. It is to be hoped, therefore, that the new arrivals will greatly enlighten us on this point. The display of the wings in the Argus pheasant is unique, the two wings being widely spread so as to form an enormous circular fan completely concealing the rest of the body. It affords an unanswerable argument to those who hold that birds in 'display' are not conscious of their finery.

#### Mathematics and Cosmic Research

IN a lecture entitled "World-Gravitation by Kinematic Methods" given by Prof. E. A. Milne before the London Mathematical Society on May 17, his hearers had the thrilling experience of seeing a possible model of the universe constructed before their eyes by a simple, but wholly brilliant, application of apparently trivial mathematical methods. Starting with Newtonian time, Prof. Milne envisaged the behaviour of a set of particles of which the description given by an observer placed at any one of them would be the same as that given by an observer placed at any other. The hypothesis leads to certain functional and differential equations from the solution of which Prof. Milne deduced a statistical model of extreme elegance. The astonishing result was obtained that in a given volume of the observer's space there are particles the velocity of which is arbitrarily near that of light. On this, Prof. Milne showed how a theory of cosmic rays and obscuring matter in interstellar space could be based. The striking simplicity of the method and the far-reaching character of its interpretations open up a new vista of possibilities for cosmic research.

#### Demonstration of Television

ON May 15 a demonstration of the use of the cathode ray tube in television reception was given before the Electrical Association for Women at the showrooms of the Edison Swan Electric Co. Ltd., London. After a very clear and non-technical exposition of the basic principles had been given, the B.B.C. 30-line transmission was received. The results obtained suggested that the cathode ray tube is capable of giving as good an image as the limitations of the transmission will permit. There was very little flicker, owing to the large afterglow of the fluorescent material of the screen. The latter was of the usual type giving a green image; the use of white fluorescent screens is not considered desirable at the low picture frequency at present in use, as the afterglow with these is much less. The scanning is accomplished by means of two small oscillators giving voltages of saw-tooth wave-form and appropriate frequencies which are applied to the two pairs of deflecting plates; the incoming signals hold these oscillators in synchronism with the transmitter and also modulate the intensity of the electron beam. Difficulty was experienced in keeping the picture steady during the demonstration, but this was attributable to the exceptionally bad local reception conditions. It was stated that in normal circumstances the controls need not be touched during the whole transmission period of half an hour. The advantages claimed for the cathode ray tube are that it is noiseless, that signals of good headphone strength only are required to operate it, and that by the alteration of a few minor circuit components it can be easily adapted to suit transmissions of different numbers of lines and picture ratios. The last point is important in view of the uncertainty in the future development of television. Suitable tubes can now be marketed at six guineas and this price could be

substantially reduced if the demand became large enough. As the auxiliary apparatus required is not excessive, and can be assembled from standard components, the system is quite practicable for domestic use.

#### New Electric Lamps

IN a paper read to the Royal Society of Arts on March 7, Mr. J. W. Ryde of the G.E.C. Research Laboratories, Wembley, gave a full account of the working of the new electric discharge lamps. The sodium discharge lamp is practically monochromatic and of a brilliant yellow colour. Hence coloured objects illuminated by it all appear to be various shades of brown. Its efficiency, about 40 lumens per watt, although three times that of the ordinary filament lamp, is yet only about a tenth of the maximum possible yellow light that could be obtained for the same power. It is well known that the efficiencies of all kinds of electric lamp vary with their life. The problem of candle power maintenance is one that constantly engages the attention of every lamp manufacturer. In spite of years of research, the light output of incandescent filament lamps still drops by a certain amount after several hundred hours burning. The candle power maintenance for the new lamps has now been raised to a reasonable figure, but it is recognised that considerable improvements are possible. It is rapidly approaching that of the filament lamp. At present there is no sign that the eminently simple and highly developed filament lamp will shortly be replaced by discharge lamps for purposes of indoor illumination; but it must be admitted that discharge lamps will play an ever increasing part in the future of electric lighting. Already there are 65 street lighting installations for which these lamps have been adopted. Street lighting is the one use of artificial lighting for which we have never produced enough light. The use of the new lamps is an excellent opportunity of improving the lighting of our streets at little, if any, increase in the cost.

#### Importance of Deep Borehole Surveying

DESIGNERS of apparatus for surveying deep boreholes have in the past consistently underestimated difficult engineering problems necessarily attendant on such surveys. On April 10, W. E. Bruges read a paper before the Institution of Petroleum Technologists in which he made some pertinent remarks on the usefulness of well surveys as an adjunct to drilling logs and geological data. Geologists can utilise the results of accurate surveys for correcting underground contours, choosing such surface locations as will ensure economic spacing of wells in the oilsand below and making deductions as regards the formation as a whole from direction, deviation and irregularities of the hole as portrayed by the survey. Administration is facilitated by a knowledge of exact spacing of wells in an oilsand. Decisions regarding drilling activities can be taken with confidence, and the risk of overcrowding, hence decreasing production, is minimised. Recent experiments in Burma have shown

that of available apparatus for this work, that designed and manufactured by Martienssen is the most satisfactory. The instrument is fitted with a gyroscope for obtaining direction and two pendulums for inclination, results being recorded photographically. It has the advantage that the gyroscope is unaffected by magnetic influences, while the pendulum method of obtaining inclinations allows a number of readings to be taken at one run. Photographic recording of results means that the instruments below ground can be light, obviating necessity of following-up gear; moreover, their relative places in the well can be photographed without disturbing position or setting.

#### Automobiles Run by Charcoal Fuel

IN Italy, automobiles have recently been operated on a gas fuel made in transit from charcoal and steam. It is recalled in a recent paragraph issued by Science Service, of Washington, D.C., that similar experiments were made in France and other European countries several years ago. The principle involved is the same as that used in the manufacture of some kinds of gas employed in operating stationary internal combustion engines. A carbon-containing material, usually coal, is heated, and then water in the form of steam is passed over it. Carbon monoxide and hydrogen are formed in this process and both these gases burn with high heat output. Mixtures of this sort are known as 'water' gas or 'producer' gas. This gas can be used as fuel in internal combustion engines. The drawback to using these gas engines in motor vehicles is the difficulty of carrying the fuel supply. In permanent locations they can be used very effectively for power generation. To a limited extent, vehicles that run on wood or charcoal and manufacture their own gaseous fuel as they go along are used commercially in France. Science Service points out that this type of self-propelled vehicle may become important in countries like France and Italy which have no petroleum supplies within their borders. In the United States, on the other hand, owing to the cheapness and availability of petroleum, there would be no need for this kind of vehicle. In those countries where imported oil supplies are likely to be interrupted in war time, automobiles using charcoal fuel would have advantages.

#### Science and Industry in the U.S.S.R.

IN a recent publication entitled "Organisation et Principes de L'Enseignement en U.R.S.S." (Paris: Hermann et Cie, 6 Rue de la Sorbonne) Prof. Jean Trillat gives an interesting description of the relations between science and industry in Soviet Russia. One of the most important transformations brought about by the Russian revolution has been the establishment of compulsory education, and this in turn has led to a considerable development of scientific studies. Prof. Trillat points out that in order to understand correctly the nature of educational and scientific progress in Russia, it is essential to remember that there such developments have been