

Nottingham. This comprised a brief history of the utilisation of gas as a fuel for internal combustion engines, together with an assessment of its economic possibilities in competition with petrol and heavy oils. Comparisons of the usefulness of gas and petrol for internal combustion engines are not unfavourable to the former. A higher thermal efficiency is obtained with gas than with petrol; the carbon monoxide content of exhaust gases is very much lower than with petrol; starting is as good; flexibility and acceleration are superior to petrol when the engine is cold; and it is quite as safe in use as petrol. The chief drawback to gas as compared with petrol is, of course, the difficulty of carrying a sufficient quantity for any considerable mileage. Latterly, however, various firms have been experimenting in the production of light high-pressure cylinders. The real competitor of gas for road transport services is heavy oil, and at present virtually no comparison can be made between these two fuels, since in every case the greater the annual mileage, the greater the economic superiority of heavy oil. The balance in favour of heavy oil might be substantially reduced by a rise in its price; an allowance in respect of the weight of vehicle cylinders when assessing licence duties; development of a special engine for gas propulsion; or by the enrichment of coal or coke-oven gas. Without such adjustments, gas cannot enter into successful competition with heavy oil for road transport service.

#### Fireproofing of 'Fireproof' Buildings

At the discussion of the American Steel Institute at White Sulphur Springs, Va., on October 17 on 'fireproof' structures, Dr. Ingberg, of the National Bureau of Standards, stated that in steel-framed buildings it is necessary to protect the steel by a concrete covering. In a report of the discussion issued by Science Service, Washington, D.C., it is pointed out that steel supports at high temperature sag under the terrific weight of the superimposed structure. The problem before those responsible for the fire-prevention code is to ensure that sufficient covering is given to the steel members of a building to prevent the temperature giving rise to dangerous conditions. According to Dr. Ingberg, tests have shown that for moderate rises in temperature—300°–600° F.—the strength of steel girders increases as much as 25 per cent. Above 600° a decrease occurs, and hence safety considerations make it imperative that protection in the form of a complete concrete covering must be provided. Apart from the question of safety and avoiding risk of collapse of the roof and other parts of the building owing to excessive temperature rises during a fire, it is necessary to prevent excessive relative expansion between the various parts of the structure.

#### Oil-Finding Methods and Oil-Made Chemicals

THE National Research Council recently organised a five-day, 2,000-mile tour of industrial research laboratories for fifty-two leading business men. Science Service, of Washington, D.C., gives an account of their visit to the laboratories of the Gulf

Refining Company and the Mellon Institute for Industrial Research. Dr. Paul Foote, director of the former concern, described how explosions of dynamite are used to send sound waves to a depth of 10,000 ft. into the earth where they encounter rock structures and are reflected; by their speed, reflecting and refracting behaviour they indicate the nature of the underlying deposits. He was also able to show the visitors a collection of new chemicals derived from oil products, some of which have powerful destructive qualities. Dr. E. R. Weidlein, director of the Mellon Institute, pointed out that employment had been provided there for 97 trained scientific workers and 48 assistants during the last year. Their work concerned chiefly industrial problems of manufacture, but had included specifically research into the use of carbon black as a colouring material for concrete highways to minimise the glare of lights, the use of chemical metaphosphate in laundering and the bonding of tile products to steel for exterior construction use.

#### Animal Road Fatalities

SCIENCE SERVICE, of Washington, D.C., gives an interesting but somewhat alarming summary of Dr. Dreyer's statistical report of animal road deaths, made during a journey of 2,550 miles. Dr. Dreyer counted sixty-one dead animals on the road. This included cats, dogs, birds, snakes and turtles. Contrary to expectations, more turtles than chickens met their death in this unhappy way, there being counted eighteen of the former and only three of the latter among the total. Of the other animals listed, after turtles, which headed the list, skunks were the most unfortunate. Dr. Dreyer's census is of particular value in that little attention has hitherto been paid to animal road fatalities in the campaign against loss of life by the motor-car.

#### The Population Problem in Bengal

THE population of Bengal, 50·1 millions with a mean density of 646 per square mile, would seem already to have passed the stage when its needs can be met by the area it occupies. In seeking a remedy, one school supposes that if we "look after the death-rates, the birth-rates will look after themselves", and another suggests that "if we keep down the births, the deaths will keep down themselves". Cedric Dover, in a critical survey of the situation, concludes that control of the birth-rates is likely to furnish a more useful contribution than exclusive attention to death-rates (*Population*, 2, No. 1, November 1935, p. 90). A maximal population cannot be maintained above the bare subsistence level, even with radical progress in economic prosperity. The population of Bengal has already outgrown its resources, and the time seems to have come when eugenic control of population growth should be introduced.

#### The Nucleus of the Atom

WE have received a symposium entitled "The Nucleus of the Atom and its Structure" from the Ohio State Chapter of the Sigma Xi Society which contains a quantity of information not easily accessible

in collected form (Columbus, O.: Ohio State University, Dept. of Physics, 1935, pp. 104, 1 dollar). W. F. G. Swann contributes an account of cosmic rays in which he explains his theory of particles producing secondaries frequently at first and less frequently as they lose energy in penetrating the earth's atmosphere. He also speculates on the origin of the energy of the charged particles. M. L. Pool contributes an article on the energies and products involved in nuclear disintegration and synthesis, which contains a number of extremely useful tables and data on these processes. H. L. Johnston summarises the uses of deuterium as a research tool in physics, chemistry and biology. E. O. Lawrence gives a historical survey of artificial radioactivity and an account of recent work in the California laboratory on this subject. G. Gamow contributes a short article on nuclear transformation and the origin of chemical elements which discusses the astrophysical aspect of nuclear reactions.

#### Spanish Archaeology and the University of Oxford

AN important addition to the provision for archaeological research in the University of Oxford will be made by the election by Queen's College of a research student in archaeology at some time in June next. The field of research will be Spain, or some part of Spain, and the period under investigation will lie between the earliest Neolithic Age and 200 B.C. The period of tenure will be two years and the stipend £300 per annum. In view of the importance of Spain as a centre of culture, especially in the development of art, in later palaeolithic times, and of the desirability of a clearer understanding of its cultural relations in that and the succeeding mesolithic period, the restriction to the early neolithic period may appear open to comment; but no doubt it was held that these periods are at present sufficiently covered by those already concerned with the prehistoric archaeology of Europe generally, while development of the megalithic culture and the bronze and iron ages offer a no less fruitful and still to some extent uncultivated field to which attention may be directed to greater advantage in present conditions.

#### Science and Human Welfare

FOLLOWING upon an informal meeting at which persons connected with some fifteen organisations interested in sociological and scientific problems were present, a Research Co-ordination Committee was formed to draw up plans for the co-ordination of scientific research as applied to human welfare. The Committee held its first meeting on January 30 at Morley College, London, and drafted a preliminary list of problems worthy of investigation and a list of organisations that are likely to have material bearing on those problems. As an example may be cited problems arising out of the housing question in connexion with the clearance of slums. Five aspects (architectural, engineering, financial, medical and sociological) have been put down for consideration, and steps are being taken to collect the necessary information. The offices of the Committee are at Hazlitt House, Southampton Buildings, W.C.2.

#### Chemical Research in Czechoslovakia

THE *Collection of Czechoslovak Chemical Communications* has just completed its seventh volume. This journal continues to record the investigations in pure chemistry carried out at the Universities of Prague and Brno. It is significant that no less than thirteen papers describing polarographic researches with the dropping mercury cathode appeared last year from the laboratory of Prof. J. Heyrovský. Prof. E. Votoček and his co-workers published ten papers dealing with various sugar derivatives and their behaviour with Grignard's reagents and other organic bodies. Another fruitful field of research has been the application of organic reagents for the detection and estimation of metals. This work is being carried out at Brno by Prof. Dubský and his fellow-investigators.

#### An Active Group of Sunspots

A RECENT group of sunspots, not remarkable for size, complexity or visible changes of structure, has proved of interest on account of its great activity when observed spectroscopically, especially in the hydrogen line C or  $H\alpha$  of the solar spectrum. The group consisted of two spots of regular outline,  $10^\circ$  apart in solar longitude, accompanied by two or three wide clusters of small spots, making in all a stream extending over  $20^\circ$  of longitude. The position of the centre of the stream was: long.  $164^\circ$ ; lat.  $27^\circ$  S.; central meridian passage February 14.0, when the spots passed about  $20^\circ$  of latitude south of the centre of the sun's disk. The area of the stream averaged about 800 millionths of the sun's hemisphere or 930 million square miles. Between February 7 and 14 inclusive, the spots were examined as often as possible with the Hale spectrohelioscope at the Royal Observatory, Greenwich, for a total duration of 16 hours on six days, usually before 13<sup>h</sup> U.T. During these hours of watching, equivalent to about one-ninth of the total duration of the epoch, eight bright eruptions of hydrogen were observed, so that a considerable number of eruptions is indicated by this sampling as having taken place in connexion with the spots.

Most of the eruptions were of minor importance, but on February 14 one of appreciable extent, and involving large radial velocities of accompanying dark clouds of hydrogen, was fortunately observed in its entirety. This eruption, which occurred within a few degrees of longitude from the central meridian, began within a minute or two of 12<sup>h</sup> 39<sup>m</sup> and lasted until 13<sup>h</sup> 27<sup>m</sup> U.T. Besides the streaks of bright emission, which at their maximum intensity were about equal to that of the continuous spectrum adjacent to  $H\alpha$ , a dense cloud of relatively dark hydrogen was moving outwards from the sun with a maximum observed velocity of 210 km./sec. Within ten minutes, other dark patches or filaments were visible with velocities of recession, showing that the ejected hydrogen was to a large extent falling back towards the sun, and by 13<sup>h</sup> 03<sup>m</sup> when the outward motions had ceased, the measured inward velocities were of the order of