Ministry of Knowledge.

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THERE is in most of us a desire—often through sheer modesty unexpressed—to use our knowledge and experience for the common good ; this is the impulse which may masquerade under that much-abused name "Service". Although sometimes pretentious, it is essentially a worthy impulse for, more than anything else, it justifies the years of effort spent in obtaining a higher education and the sacrifice of those who have made that privilege possible.

True, the opportunities for service which lie open to the young graduate are few and apparently trivial, but this does not mean that we should ignore them. A habit of mind comes with practice, and there is at this moment a special timeliness for the cultivation of that habit as the world stands in need of all the help we can give. The shallowest of optimists must admit that this is not a particularly happy age. Something has gone wrong with the world, and we search feverishly for hasty cures to meet sudden ills. The spread of education does not seem to have exercised any beneficial effect ; indeed, it almost seems as if education had aggravated matters and the reason, as I see it, is that new knowledge is wrested from the unknown and poured into the world at a rate faster than man's feeble absorptive capacity can accommodate. Here is a new aspect of this age of speed.

The result is that we live under conditions which impose, to an extent never exceeded in History, the necessity for swift action to meet the sudden cataclysmic changes which assail mankind. To say this is not to repeat mechanically a platitude or to echo an idle fear, for it is a sobering truth that the world is moving too fast. I admit that civilisation has already passed through many periods when disorder and unrest threatened and, in the end, destroyed the peace which is man's natural inheritance. Equally, there have been times when a quick succession of discoveries—geographical, industrial and scientific—created new economic factors and produced confusion out of which order was slowly evolved. Yet, reflection convinces me that, since the close of the Middle Ages, civilisation has never been subjected to so many sudden shocks as in the age of discovery in which we live. It is not so much the multiplicity of these changing conditions which has baffled and perplexed us as the fact that the swiftness of their impact has caught us unprepared. Science and her foster-child invention have showered upon the world powers which have been rapidly exploited mainly for the individual gain of the moment and without regard for the greater good or for the future. No doubt it has always been the case that discovery has progressed in advance of man's intelligence and of his capacity to utilise new knowledge, but never before has man been given so little time to adapt himself to the impact of the new ideas he himself has evolved. While there is invariably a lag period between the origin of new knowledge and its applications, that interval has shrunk in our time almost to vanishing point until effect succeeds cause as swiftly as thunder follows lightning. We need not pause to multiply examples when we recollect that nearly two centuries of effort were required to transform early experiments on gas pressures into the steam engine and the locomotive, while less than a single generation has seen the development of the internal combustion engine to give the motor car and the aeroplane.

In more senses than one, we live in an age of speed, and speed brings its dangers. There is no alternative, than, but to act in advance by forecasting the channels down which discovery is likely to drive mankind and to frame national policies in accordance with these predictions. The few minutes of a graduation speech do not permit elaboration of this theme but surely it is not vain to hope that some day the machinery of Government will include as a matter of course a Ministry of Knowledge whose function, to put it in the briefest possible way, is to look ahead. When conditions, apparently stabilised, can be upset almost *overnight by a single observation in a* laboratory there is need for the finest intellects in the country to be set apart for the purpose of predicting the repercussions of new knowledge on all phases of life. Such an organisation would not invade

the province of existing departments of State, for its chief concern would be with the future rather than with the issues of the day and hour. Then, perhaps, it will be possible to frame in advance a national policy in which due regard is paid to such far-reaching problems as new sources of energy, such fundamental questions as to whether our coal supplies are to be used merely for power or as raw material for manufactured products, whether our forests —long-dated investments at the best—will be utilised for the purposes for which they were planted or devoted to alternative uses already looming in sight. Had there been in existence thirty years ago such organised legislation as I have suggested the world might well have been saved from at least some of the devastation created by unemployment; we would at least have been spared the humiliation of seeing the policy of international sanctions put into effect without sufficient preparation in advance of the moment of emergency. These are but examples; yet they are sufficient to show that all public departments—trade, education, health and defence included—would benefit in the end if trained intellects were entrusted in this way with the hazardous role of the prophet.

These are large issues and I must remember that I am speaking not on a political platform but to graduates of a Scottish University. If the larger problems to which I have referred must, for the time being, lie beyond the range of your effective help—our Ministry of Knowledge is still a dream—there remains much in which you can play a part, if only on a modest scale and within a shorter radius.

—(*From a speech delivered by Sir James Irvine at the Graduation Ceremony held at St. Andrews, June 1936.*)

Science and the Indian Oil Industry.

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Historical.

Introduction.—Such familiar words as aeroplanes, motor cars, diesel engines, are surely as representative of modern transport as any words can be, and they suggest to us the important part played by petroleum and its products in civilisation. We are apt to forget that some petroleum products have been known for centuries, and it is perhaps a little surprising to learn that when Julius Cæsar put asphalt on his roads he was merely following the example of Nebuchadnezzar. The use of oil in India —or at least Burma[1]—although it can hardly claim such antiquity, goes back to very ancient times. The source of the oil was Yenangyaung, some 300 miles up the Irrawaddy, where wells were dug by hand to very considerable depths. The oil served a variety of purposes—it was used as a preservative of wood work, as a medicine, for lubricating, and as an illuminant. In other parts of the world oil was collected from seepages, small pits, hand-dug wells, and occasionally by accident from wells bored for water.

Early Drilling.—It was not until after the middle of the nineteenth century that any attempt was made to drill wells specially for oil, using regular machinery, the earliest American oil-well being completed in 1859, and from this time dates the beginning of the modern oil industry. It is of interest that as early as 1866 an attempt was made to develop the oil of Assam, and wells were drilled there, although without much success, before actual drilling started in Burma. In 1869–70 wells were drilled in the Punjab, but also without success.

Shortly after this, oil refining was commenced in Rangoon, the oil being floated down the Irrawaddy in large earthenware jars from the Yenangyaung field, where it was worked by certain Burmans known as Twinzas. After the deposition of King Thibaw, the Twinzas' rights were confirmed, and portions of the oil-field allocated as

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[1] In these notes, India is throughout taken as including Burma.