compared the potential changes in the optic nerve on stimulation of the eye with the known corresponding sensory experience. A short, weak flash of light results in a simple optic nerve discharge without subsequent changes. In vision this is registered as a simple flash of light. With a longer or more intense flash, the optic nerve record is a series of fairly regular waves following the simple *on* response. Visual experience reports this as a brief period of just distinguishable flicker. With a still longer or a more intense flash, there appears a prominent secondary wave which replaces the train producing the flicker; it and the *on* response yield the paradoxical experience of seeing two flashes. The secondary wave drops out as intensity or duration is increased, and visual experience loses its duality.

When the cortical response is recorded, the results are not so clear, and frequently involve interpretation. The most interesting fact is that a strong repeated stimulus may force the cortex to set up a rhythm in tune with the stimulus.

The paper by Prof. Stephen Polyak, of the University of Chicago, was a brief summary of material since published as a volume, "The Retina", in the Anniversary Series of the Chicago University Press. The essential point is that the complex structure of the retina agrees with the complex nature of the visual process. There are at least thirteen different types of neurons in the retina arranged in three levels: the photoreceptors (rods and cones), the analysers and association neurons (bipolar cells, horizontal cells and probably amacrine cells), and the integrators (ganglion cells).

The relations among these elements are complex and stable, and are at least thirty-five in kind. Some indicate an analysis of impulses from the photoreceptors; others suggest 'final common path' functions; while still others may even be inhibitory. Besides the perception of light and of colours, the retinal structures lend themselves to an interpretation of the various aspects of space perception, in terms of the degree of individuality in the connexions of the three components.

The symposium was closed by Prof. K. S. Lashley, of Harvard University, who proposed a new theory of cerebral organization. Animals are capable of perceptual generalization. When trained to differentiate on the basis, say, of specific sizes, they carry this over to a variety of visual arrangements. An object retains its essential form though we view it from different fixation points. The problem is that while nerve impulses are transmitted over definite pathways, behaviour seems to be determined by masses of excitation within general fields of activity without regard to particular nerve cells.

The exact topographical projection of the retina on the striate area may not be primary, because the olfactory sense is also accurately projected, yet it does not correspond to olfactory space. It may be that the geometry of nervous integration is quite different from the geometry of the stimulus.

The surface of the cortex contains connexions which permit the passage of activity in all directions. From a single focus, excitation may spread over the whole cortex, and because of the refractory period this spread will be wave-like. From several foci, interference patterns will be formed extending over the whole cortical area. Thus a given retinal configuration can produce a characteristic pattern of standing waves on the cortex which then forms the basis for its recognition.

Motor responses also are generalized. A rat which has learned a maze can follow it with unpractised muscle groups; thus a rat with a cerebellum lesion will roll rather than crawl through the maze successfully. The essential equivalent of visual perception is thus translated into an essential equivalent of muscle function. This means a revision of current notions of sensory motor organization. There is demanded a much more diffuse and widespread connexion between sense organ and motor neurons, a connexion in terms of an overall pattern perhaps such as is suggested for sensory organization.

RECONSTRUCTION IN CHINA

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CHINA has already begun to plan her national reconstruction after the War. But given good plans for Chinese reconstruction, and given sufficient capital and raw materials, China may not be able to carry out her programme of reconstruction successfully and effectively unless she has adequate supply of scientific men, engineers and technicians. At present there is already great shortage of trained personnel in various fields, especially in science and technology. Due to the lack of library and laboratory facilities as a result of destruction by the Japanese, and also to the insufficient number of first-grade professors in China, the training of scientific and technical personnel for cultural and economic reconstruction in China will depend, more than ever before, upon sending students to study in American and British universities. Unfortunately, since the outbreak of the war in China, the number of students studying in the United States and Britain has been reduced by more than a half, while very few remain on the European Continent. Unless a well-planned programme for training men and women for the tasks of reconstruction is worked out well in advance, the shortage of scientific and technical personnel will be very much more acute when the War ends and reconstruction in industry and agriculture is begun.

Such a programme for training scientific and technical personnel for China calls for the active co-operation and assistance of Great Britain and the United States. It means that for many years to come, before the Chinese universities are re-equipped and brought up to modern standards, and have sufficient good teaching staff, Chinese students will continue to be sent by hundreds to the United States and Britain for scientific and technical education; it means that many American and British professors will have to be invited to teach in Chinese universities.

It was with this purpose in mind that I am visiting Great Britain and the United States as the representative on education of the Chinese Government to seek for co-operation and assistance from these two countries. As the project of inviting visiting professors to teach in Chinese universities cannot be carried out before the universities are sufficiently re-equipped, my negotiations in Great Britain have been confined to the arrangements for sending Chinese students to study in British universities or to obtain experience in factories. There are two parts in this project: (1) sending graduate students with two or three years of practical experience in China, either to study in a British university or to practise

in a British factory; and (2) sending a number of Chinese university teachers, especially teachers of science and technology, to Great Britain, to refresh their learning and to get acquainted with the latest developments in various scientific and technical fields.

British intellectual and industrial leaders have responded sympathetically and generously to my proposal in connexion with the first part of the project. If the arrangements so far made for sending Chinese students to be trained in Great Britain are carried out with success, I shall, in the near future, take up negotiations concerning the second part of the project.

American educational and industrial leaders have also responded to my proposal with sympathy and enthusiasm. It is hoped that through exchange of information and mutual understanding, the efforts of Great Britain and the United States to assist China to rebuild her culture and to train young minds for her national reconstruction can be co-ordinated, and that greater cultural co-operation between China and the English-speaking nations can be secured.

I have laid great stress on the importance for the national reconstruction of China after the War of training scientific and technical personnel. This must not be taken, however, to mean that other aspects of cultural studies, such as fine arts, philosophy, literature and the humanities, etc., are to be neglected. On the contrary, such subjects will receive due attention in the programme of cultural reconstruction in China. In fact, it is my hope that even in training young scientific workers and engineers each student would acquire a good cultural background together with his technical education.

OBITUARIES

Viscount D'Abernon, P.C., G.C.B., G.C.M.G.,
F.R.S.

EVEN in peace-time, there is a constant but subdued lamentation on the part of scientific men that their subject receives but scant consideration by politicians and others controlling public affairs in formulating and executing public policy. In war-time such lamentation is less subdued. When, therefore, a great public figure has used the weapon offered by science to the great benefit of the State, it is only right that his death should call for more than a passing reference. Viscount d'Abernon, whose death at the age of eighty-four occurred on November 1, was a man who, without any special training in science, came to have a great belief in the part it might play in government. He was a man of remarkably wide interests and achievements, a statesman but not a politician, and a man of the highest culture, who knew, or wished to know, the best that had been thought and said in the world. He had also the keenest appreciation of art, especially of painting and the drama. Nothing human was foreign to him.

It will be remembered that, in the War of 1914-18, alcoholic intoxication became an enormous problem, of such magnitude indeed that it interfered greatly with the production of war material. To meet this situation, Mr. Lloyd George set up the Central Liquor Control Board and made Lord d'Abernon its chairman. The object was to find any or every

means, short of prohibiting the production and sale of alcoholic liquor, which could reduce the evil to a minimum. The success obtained by this Board has never been really appreciated, but those who remember the extent of drunkenness in pre-war days cannot but conclude that the Liquor Control Board conferred one of the greatest social blessings on Great Britain. This inappreciation of valuable work is often seen when the state of man is changed for the better. Most medical men are very familiar with the phenomenon. They know only too well that, when a dramatic method of treatment is discovered, so that the dying or moribund are restored to health, this and its discoverer are hailed with great enthusiasm. They know equally well that, when a disease is eliminated by the discovery and application of a preventive method, there is no excitement, the change passes unnoticed and is taken for granted. This is what happened as the result of Lord d'Abernon's work in the case of alcoholic intoxication. The country has become relatively sober and the accursed social conditions due to widespread drunkenness have practically disappeared without comment.

Those with intimate knowledge of the Liquor Control Board know that Lord d'Abernon was not a figure-head as its chairman, but that he played the leading part in its deliberations and activities and gave up all his time to its work. The masterly way in which he controlled a body, which included brewers, clergy, politicians and Civil Servants, and obtained from them unanimous decisions, was a remarkable achievement. Confronted as he was at all stages by partisan statements on the action of alcohol, he decided that the only way of getting the truth was to appoint a body of scientific men in an advisory capacity. This body included among others Prof. (now Sir Charles) Sherrington, the late Prof. A. R. Cushny, Dr. (now Sir Henry) Dale, the late Prof. W. McDougall, and Prof. M. Greenwood. They gave careful consideration to the whole question of the pharmacology and toxicology of alcohol and proceeded to write the well-known book "Alcohol: its Action on the Human Organism". Where there were outstanding gaps of practical importance in knowledge, such as the relative intoxicating properties of concentrated and dilute alcoholic beverages, or the rate at which alcohol disappears from the body, or the kind of food which best inhibits or reduces the intoxicating effect of alcohol, he called for further experimental work. It fell to my lot to carry out this work on behalf of the Central Liquor Control Board. It was characteristic of Lord d'Abernon that he was not content simply to receive the results of this work, but often went to see the experiments on animals and man being made.

Had the Central Liquor Control Board been allowed to continue its work, d'Abernon's success in settling the liquor problem would have been even greater than it was. As soon, however, as Mr. Lloyd George saw that parliamentary agreement could be obtained on some of the Board's recommendations, he jumped in, secured the necessary legislation and dismissed the Board. Even so, its success was enormous, so that in a broadcast in 1931, Lord d'Abernon was able to say that "it had directly or indirectly added 100 millions to the public revenue and had cured the country of nearly two thirds of the evil results of intemperance". Brewers and distillers and public houses continued their lucrative trade, shareholders in these concerns drew the same or larger dividends. Patrons of Bacchus could still get their quota of