

News and Views

The Ultra-Centrifuge in Biochemistry

THE substance of lectures by Prof. The Svedberg, delivered in Oxford earlier this year at the inauguration of an ultra-centrifuge in the Department of Biochemistry of the University, is printed as a supplement to this issue of NATURE. The work described represents the culmination of a definite stage in Prof. Svedberg's research with the ultra-centrifuge. By a remarkable feat of engineering, he has succeeded in applying a simple principle to the measurement of molecular weights in a region which seemed inaccessible except through osmotic methods; and since these gave no information as to molecular homogeneity, no idea could be reached of the individual molecular weights of a possible mixture. His ultra-centrifuge, capable of reaching with a rotor of 180 mm. diameter speeds of at least 66,000 revolutions per minute and forces of 300,000 times gravity, seems to be for the moment the only method of getting adequate resolution in the 'mass spectrum' of a mixture of proteins. It is driven by oil turbine and has a horizontal rotor running in hydrogen at a pressure of about 25 mm. Particularly interesting is his mention of the experiments upon the best forms of steel to be used in rotor construction. They indicate all too briefly how much experimental work has been needed to evolve a final form of the apparatus. The studies upon proteins have clearly arisen in Uppsala from the long-continued interest of Prof. Svedberg in colloids. Even before the development of the recent work, he had already made valuable contributions to colloid chemistry; but these must be regarded as of minor importance in the light of the discoveries here summarized.

THE significance for biochemistry of the new work can scarcely be exaggerated. For the first time, it has been possible to know whether a protein solution is homogeneous, and knowing this to define quickly the number of molecular species present in a mixture. The latter enables us to follow the entry and presence of a foreign protein in such a medium as the blood plasma; the implications of this for a study of diseased conditions are clear. It also provides a means of following changes in molecular weight produced by varying treatment of a pure protein such as albumen. In this way it has been shown at Uppsala that slight changes in hydrogen ion concentration (which have always been realized to be of great importance in biochemistry), can cause either reversible or irreversible dissociation of a protein. Further, it is remarkable that in several cases there should be similar changes induced by crystalloids, sometimes present only in traces. A particularly striking instance is recorded for the effect of 0.001 gm. per cent of thyroxin upon a solution of thyroglobulin. Such effects, and there seem to be many of them, can scarcely fail to throw light upon the

intimacy of the cell itself, where the proteins in their colloidal relations form one of the most significant features of life. The final table which records the analysis of all the proteins so far studied is remarkable for the regularities that have come to light. With few exceptions, it seems that the molecular weights of the proteins fall into well-defined multiples of 17,600. Here for the first time, we feel that there is some chance of reaching the protein ultimately by the methods of organic chemistry, since these results signify some underlying simplicity of construction.

Agriculture and Industry

IN his recent Mather Lecture to the Textile Institute on "Agriculture as a Potential Source of Raw Materials of Industry", Sir Harold Hartley described the present-day uses of many agricultural products for industrial purposes, and indicated some possibilities of further expansion. His method of approach was that of the short-term extrapolator rather than that of the Utopian dreamer, who, although a more successful prophet as a rule, is apt to disregard the mundane but essential element of cost. Sir Harold left the sphere of social economics severely alone, but he emphasized that development of agricultural industries would promote closer co-operation and better understanding between farm and factory. Only about 12 per cent, by value, of the world's agricultural production is now used for industrial purposes, but the proportion is raised to one third if forest products be included. In spite of the triumphs of the chemist, first in revealing the structure of many organic molecules, and then in synthesizing many natural products, or in processing them, the factory cannot compete with Nature in the cheap production of complex organic compounds; for supplies of cellulose, the key substance of fibrous structures, we must always rely on the plant. The future lies not in competition between Nature and the chemist, but in their closer association to produce the materials needed by man. Such a development of the use of agricultural products will help to conserve our supplies of coal and oil, for whereas these represent wasting capital assets, plant products, ever renewable by solar radiation, represent revenue without debit to capital.

IN the United States the Farm Chemurgic Council is working "to advance the industrial use of American farm products through applied science", and its members meet annually at Dearborn to discuss their problems. Among the many difficulties confronting American agriculture are soil erosion, loss of fertility due to continuous cropping, displacement of the horse by the tractor, and decreasing exports and increasing imports of farm products. It is hoped to combat some of the bad effects of these conditions by growing

new crops to replace imported products, by finding new outlets for established crops, and by better utilization of agricultural waste. Among the new crops are the soya bean, which now covers six million acres. Substances extracted or made from it have manifold uses, and Henry Ford has built a large plant for making plastics out of the meal. Tung oil, valuable for paint and varnish making, is to be derived from extensive plantings of the tung-oil tree; and, also in the Southern States, the quick-growing Southern Pine has been planted over 200 million acres to provide pulp for newsprint and as a raw material for rayon and 'Cellophane'. Among the new outlets for old crops are the use of cotton fabric for reinforcing tarred roads, of inferior cotton and cotton linters for making cellulose derivatives, and of maize for the production of starch, dextrin, corn syrup, dextrose, corn oil and cake. Also under investigation is the utilization of the enormous quantities of straw, cotton stalks, and husks that now run to waste. By promoting agricultural industries on the above lines, it is hoped to put the farmer financially on his feet, and to make him a better customer of the factory.

Total Solar Eclipse of June 8-9.

THE fact that the expedition of the National Geographic Society and the U.S. Naval Observatory was accompanied by engineers and announcers of the National Broadcasting Company of America has led to the overlooking of the other expeditions organized to observe the recent total solar eclipse (see NATURE of June 12, p. 993). It is good to report that Mr. C. B. Michie, who led an expedition from New Zealand with the aid of the Royal New Zealand Navy also to Canton Island, shared in the good luck in the form of fine weather that came the way of the American party, and secured good photographs of the corona with several very long streamers. Further, it transpires that the Princeton party to Chemboté in Peru—and it is hoped the Japanese party there also—had fine weather for the actual eclipse, though as at Canton Island weather prospects were anything but favourable not long before the eclipse. The value of the results obtained by the various parties (and by the party from Princeton, the Franklin Institute and the Cook Observatory on the S.S. *Steelmaker* near the point of maximum totality) cannot yet be assessed, but in view of the number of experienced observers concerned, one may confidently look forward to results of very considerable importance.

International Peace

THE annual report of the Director of the Division of Intercourse and Education of the Carnegie Endowment for International Peace for 1936 pleads for further support for genuine world organization and collective security through an effective world police force. Dr. Murray Butler refers to the existence of a deep-seated popular sentiment against war and to the necessity of this opinion finding expression not merely in emotional outbursts but also in support of definite policies of social, economic and political

co-operation and the substitution of judicial process for the threat of force in settling international differences. The advocates of economic nationalism and of neutrality, he said, are making a most insidious attack upon the foundations of prosperity and of peace, for the first involves ultimate national suicide and world-wide disaster and the latter neglect of the highest international obligations. Dr. Butler pointed out that the wars which are most threatening at the present time are between fundamental philosophies of life and of public order, and he referred to the dangers confronting democratic nations.

THE Inter-American Conference at Buenos Ayres in December was the brightest feature of the year and received support from public opinion in both American continents. The report refers to co-operation with the International Chamber of Commerce and the adoption in August by the Joint Committee of thirteen practical recommendations for improving commercial relations between nations and dealing with monetary stabilization. Reference is also made to the distribution of literature, to the Leadership Training Conference held in Des Moines, Iowa, to the work of the visiting Carnegie-professors, to the International Relations Clubs, of which 805 have now been formed, as well as to the work of such associated institutions as the American Academy of Political and Social Science, the Institute of Public Affairs at various universities, the Institute of Foreign Affairs, Earlham College, Richmond, Indiana, and the Institute of Pacific Relations. Details of similar work of the Division in Europe are included, indicating the great extent to which the Division utilizes the opportunities afforded by existing organizations for carrying out its educational work.

Archæological Discoveries in Northern Syria

SIR LEONARD WOOLLEY'S first report on the current season's work of the British Museum's Archæological Expedition to Northern Syria records important discoveries, which throw fresh light on the Hittite occupation of that area and would seem to confirm references in the Biblical narrative to the relations of the Hittite people and the inhabitants of Palestine in the patriarchal age, which hitherto have been regarded as anachronisms. The expedition, Sir Leonard reports (*The Times*, June 12), has completed its first season's work in the Amk plain, inland from Antioch. The time available was brief, as excavations begun last year at Mina had to be completed; but an isolated area about twenty yards square in what was believed to be the aristocratic quarter of the city, opened up to a depth of 13 ft., has revealed a magnificent building, one of the finest as yet found in northern Syria. This structure is Hittite. It was built of basalt, mud-brick and timber. The approach was from a tile-paved area by way of a flight of basalt steps between platform buttresses, and led through a colonnade into a wide entrance court. The building had been destroyed by a fire; but the chambers adjoining the court were rich in finds of pottery, local and imported, including