recording apparatus is shown working in conjunction with a model pile-driver.

Another interesting series of exhibits on this stand is concerned with the 'creep' of concrete. When subjected to sufficiently high tensile or compressional stresses, concrete has the property of flowing slowly to relieve the stress, a feature which in some circumstances might have unfortunate consequences. Methods of examining this property are shown, together with numerous experimental data.

In the Heating Section of the stand of the Department of Scientific and Industrial Research, special mention may be made of the instruments developed for the measurement of the degree of comfort of a room in terms of 'equivalent temperature'. The 'eupatheoscope' is a research instrument designed to react to its environment in much the same way as a human being. Simple portable instruments, on the principle of the kata-thermometer and suitable for the general use of the heating and ventilating engineer, are also exhibited.

Finally, attention may be directed to the very topical exhibit of the 'housing centre', dealing with London's slum problem and entitled "New Homes for Old". Much of the material exhibited—for example, the reconstructed slum—has mainly a humanitarian appeal, but those portions concerned with the town-planning aspect of the problem, particularly that due to the "Mars" group of architects, are of a notably scientific character. It is to be hoped that the analytical treatment of the slum problem, which is here exemplified in the case of Bethnal Green, will lead to a better appreciation of its complexity and to its more rapid solution.

One of the most interesting suggestions for replanning is that of the British Steelwork Association, that buildings in the centre of London could with advantage be made more nearly uniform in height, but that, on selected island sites, greater height than the standard should be allowed, provided that ground area was given up for the widening of the surrounding streets. The suggestion is supported by an attractive model.

H. E. B.

Chemistry of Antigens and Antibodies*

DR. J. R. MARRACK prefaces his review of the chemistry of antigens and antibodies and the nature of the reaction between them by a short account of certain aspects of physical chemistry, including recent developments of our knowledge of the shapes and sizes of molecules and the application of this knowledge to proteins, on account of their importance in connexion with immunological specificity. The part played by polar forces in the orientation of molecules, in their distortion and in the specificity of the binding of one molecule to another, as in mixed crystal formation, is described, whilst an account of the structure and properties of different proteins, especially those of the serum, forms an excellent introduction to the main part of the review.

Antibodies appear to be proteins, and attempts to prepare them free from proteins have failed. It is generally agreed that they are precipitated with the globulin fraction of serum, whatever method of precipitation is used, but are usually not confined to any particular fraction: the antibodies in anti-pneumococcal horse (but not rabbit) sera are, however, unique in that a large proportion can constantly be separated, highly purified, in a fraction of the serum globulin, by precipitation in low salt concentration or with alcohol. The stability of antibodies to various agents is similar to that of the proteins.

The composition of the antigen-antibody complex is also in favour of the view that antibodies are proteins: for example, the precipitate of antigen and antibody contains about 90 per cent protein, even when the antigen is one of the specific carbohydrates obtained from pneumococci. An appreciable amount of globulin is taken up by the antigen from the antiserum; the evidence suggests that this globulin is the actual antibody rather than protein adsorbed non-specifically by the antigen-antibody compound. No definite differences between antibody and normal serum globulins have been demonstrated, except the specific power of combining with antigens possessed by the former. On immunisation, a considerable new formation of globulin takes place, but only a part of this can actually react with the antigen.

Our knowledge of the nature of antigens has been increased by the work carried out in the last decade on the antigenic character of artificial azo-proteins. Various diazotised compounds can be coupled with proteins, combining presumably with the tyrosine and histidine of the protein molecules. The protein then has a new immunological character dependent on the determinant group attached to it. Thus the serum of an animal immunised to it will give a precipitate with other proteins coupled with the diazotised compound; anaphylactic shock can be produced in a guinea pig sensitised to it by injecting another protein containing the same determinant group. Both precipitation and shock can be prevented by the presence of an excess of relatively simple substances coupled with the diazotised compound, for example, an amino-acid such as tyrosine; these substances do not themselves form a precipitate with the antibody.

The specificity of the artificial antigen depends both on the group introduced and its spatial configuration. Natural protein antigens do not apparently contain such characteristic determinant groups, but only differ in the proportions and arrangement of the amino-acids of which they are built and the consequent structural differences. Immunological reactions may reveal differences between proteins which are not detected by physical or chemical methods. In addition to proteins, several polysaccharides have been isolated from different organisms, which react specifically with appropriate antisera, and their structure has been worked out sufficiently for it to be possible to relate this to their immunological behaviour.

The antigen-antibody reaction takes place in two stages: in the first, combination occurs, due to intermolecular forces, the specific character of the combination being ascribed to an appropriate distribution of polar fields on the determinant group of the antigen and on the antibody and to purely spatial considerations, since the approach of a determinant

* Medical Research Council. Special Report Series, No. 194: The Chemistry of Antigens and Antibodies. By Dr. J. R. Marrack. Pp. 135. (London: H.M. Stationery Office, 1934.) 2*s.* 6*d.* net.

group to a receptive site on the antibody may be prevented by an inert substance which gets in the way. The presence of such receptor sites on antibody molecules usually makes no difference to the protein, detectable by ordinary means: the adsorbing sites of a globulin acting as an antibody appear different from those by which it is bound when acting as an antigen. Combination of antigen and antibody is usually followed by a secondary reaction, such as precipitation, agglutination, etc. The principal constituent of antigen-antibody precipitates is protein derived from the antiserum. In the case of sensitised particulate antigens, it appears that the antibody globulin coats the particles, conferring new properties upon the complex which are very similar to those of proteins denatured, for example, by heat.

Dr. Marrack's review describes in great detail the features of the second stage of the antigen-antibody reaction and concludes with a brief discussion of the theories of the production of antibodies, including Ehrlich's side-chain theory, with which, he concludes, the developments of immunology appear to be in agreement.

The First Rhodesian Meteorite

SOUTHERN RHODESIAN GOVERNMENT'S GIFT TO THE BRITISH MUSEUM

IT was announced in the *Times* of May 25 that the first Rhodesian meteorite had been presented to the British Museum by the Government of Southern Rhodesia. The stone, weighing 48 lb. 11 oz. (22 kgm.), has since been received, and it is now on exhibition in the Central Hall of the Natural History Museum at South Kensington. It fell at 12.45 p.m. on March 7, 1934, in the Mangwendi Native Reserve, 40 miles east of Salisbury. A brilliant meteor (fireball) was seen, and three loud detonations followed by a rushing noise were heard, the detonations being heard over a radius of 50 miles. The natives said "the sun came rushing from the sky and buried itself in the earth", and they called the stone "Miminimini" meaning "something to make you gape". In its fall, it broke off the branches of a tree and made a hole 3 ft. across and 18 in. deep in stony ground. The stone itself was broken and fractured by the fall. In addition to the main mass, several small pieces were recovered, and the weight of the whole must have been about 60 lb. But this could have been only a fraction of the original weight when the stone entered the earth's atmosphere at a height of about 100 miles. Travelling with an initial velocity of 20–40 miles a second, the intense heat developed by the resistance of the air melted and dissipated material from the surface, causing a rapid diminution in size of the stone and in its velocity.

Fortunately, the stone was secured soon after its fall by the officers of the Geological Survey of Southern Rhodesia, and in the Survey Laboratories at Salisbury it has been submitted to a detailed and complete chemical and petrographical investigation. It consists mainly of stony matter with small proportions of metallic nickel-iron (3·17 per cent) and iron sulphide (troilite, 4·98 per cent). The stony portion consists of olivine, enstatite and felspar, forming a compacted mass of minute broken fragments with curious rounded grains (chondrules). Such a structure is not met with in terrestrial rocks, and its mode of origin is still an unsolved problem. Various types of meteoric stones and irons are known. The new Rhodesian stone is very similar in structure and composition to those which fell as a shower at Soko-Banja in Serbia on October 13, 1877.

While meteoric irons weighing several tons are occasionally found, meteoric stones are invariably much smaller. A large mass of more friable stony matter entering the earth's atmosphere is broken up by the air resistance and falls as a shower of smaller stones; for example, at Pultusk in Poland on January 30, 1868, there was a shower of about a hundred thousand stones. The largest single stone in the British Museum collection weighs 133½ lb.; it fell at Parnallee in Madras on February 28, 1857. The largest mass of meteoric iron in the collection is one weighing 3½ tons, which was found at Cranbourne near Melbourne in 1854.

The first meteoritic specimen to be deposited in the British Museum was a fragment of the famous Pallas iron from Siberia, which was presented in 1776 by the Imperial Academy of Sciences of St. Petersburg; and fragments of one from Argentina were presented by the Royal Society in 1778. Since then, the collection of meteorites has steadily grown, and it is now the most representative collection in the world for the study of these mysterious extra-terrestrial bodies, about which much has yet to be learnt. The new Rhodesian meteorite is the fifth largest stone in the collection, to which it is a very valuable addition. Thanks are due to the Director of the Geological Survey and to the High Commissioner and the Prime Minister of Southern Rhodesia, on whose recommendation this generous donation of a unique specimen was made.

University and Educational Intelligence

THE following awards by the Institution of Naval Architects have recently been made: 1851 Exhibition Commissioners post graduate scholarship in naval architecture, 1934 (£250 per annum for two years), to Mr. Leonard Redshaw, of the University of Liverpool; Elgar scholarship in naval architecture, 1934 (£130 per annum for four years), at the University of Glasgow, to Mr. W. Ainsworth Jameson, of Messrs. William Denny and Brothers, Dumbarton; Earl of Durham prize to Mr. R. A. J. Truscott, of H.M. Dockyard, Devonport.

GERMAN educational reforms are being watched with close attention in the United States. Evidences of this appear in the pages of recent numbers of *School and Society*. In the issue of May 5 is a criticism by Prof. I. L. Kandel, Teachers' College, Colombia University, entitled: "The New German Nationalism and Education". This article alleges that the Nazi regime has set out deliberately to destroy that new education of republican Germany which was beginning to be a model for the world, and that the cult of hatred and revenge is fostered with unprecedented venom and barbarism. A week later appeared under the heading "Science and Education in Nazi Germany" an account of how the *Zeitschrift für Mathematischen und Naturwissenschaftlichen Unterricht* supports enthusiastically the purposes of the *Fuhrer*. There is a very definite preoccupation with military preparedness on the part of several writers of recent mathematical and physical articles in the *Zeitschrift*, and biologists' contributions have emphasised *Volkerbiologie* and *Rassenkunde* as cornerstones of the new German education.