The Kansas City Meeting of the American Association.

THE annual meeting of the American Association for the Advancement of Science was held at Kansas City, Missouri, December 28, 1925–January 2, 1926. This gathering was the eighty-second meeting of the Association. With it met twenty-nine scientific societies. The total registered attendance was 1931. The total number of papers read was 985.

The policy of the American Association differs from that of the British Association in encouraging the reading in sectional meetings of large numbers of communications, especially many by younger scientific workers. In another respect, however, the practice of the British Association was followed to advantage at Kansas City, namely, in that there were a number of evening and afternoon lectures specially arranged for the general public, seven in all. All sessions of sections, and the various society meetings, were open to the public. Several radio talks were arranged, and popular accounts of a large number of the papers were prepared for wire and mail service to the daily press by a local publicity committee and by Science Service, of Washington.

The address of the retiring president of the American Association, Dr. J. McKeen Cattell, editor of *Science* and the *Scientific Monthly*, was delivered on the evening of the opening day. Dr. Cattell spoke on "Some Psychological Experiments," emphasising the application of methods of psychological measurement to modern industrial and social problems.

The paper selected by the award committee for the annual 1000 dollar prize of the American Association, as an outstanding contribution to science presented at the meeting, was by Prof. Dayton C. Miller, of the Case School of Applied Science, Cleveland, Ohio, and was entitled "The Michelson-Morley Ether-Drift Experiment, its History and Significance." This paper was read on the Tuesday afternoon, as the presidential address of the American Physical Society.

A paper on a related subject was presented on the following day by Prof. James Pierpont, of Yale University. Prof. Pierpont's address was delivered under the auspices of the American Mathematical Society, as the third annual Josiah Willard Gibbs lecture. His title was "A History of Man's Effort to Solve the Problem of Space, and the Effect of Relativity on Our Views."

Two symposia were led by Prof. Michael I. Pupin, president of the Association. The first was held by the Engineering Section on the Wednesday evening, with a discussion of the relation of engineering to the fundamental sciences. On Thursday afternoon the Committee of One Hundred on Scientific Research discussed the problem of the encouragement of research workers and of securing co-operation among them. The same question was attacked by Dr. Vernon Kellogg, secretary of the National Research Council, whose address before the Entomological Society of America was entitled "Co-operation or Isolation in Science?"

President F. D. Farrell, of Kansas State Agricultural College, chose as the topic of the fourth annual Sigma Xi lecture "The Desert Becomes a Garden," telling how the region between the Missouri River and the Rocky Mountains, once marked on the maps as the "Great American Desert," has become one of the most productive agricultural areas in the world. The whole of Wednesday afternoon was devoted to a symposium on prairie ecology, participated in by the botanical and zoological groups.

The newly elected president of the Association is Dr. Liberty Hyde Bailey, formerly dean and director of the New York State Agricultural College at Cornell University, Ithaca, N.Y., well known as the writer and editor of many works on botany and on various aspects of horticulture and agriculture, as well as on rural life in general. Dr. Bailey was also chosen president of the Botanical Society of America.

The next annual meeting of the Association will be held in Philadelphia, and later annual meetings are planned for Nashville, Tennessee; New York City; Des Moines, Iowa; Cleveland, Ohio; and New Orleans, in order. This series of meetings will complete the first of the twelve-year cycles contemplated in the plan inaugurated at the Chicago meeting in 1920. According to that plan, the Association is to meet in Chicago, Washington, and New York in rotation once each quadrennium, meetings during the interim years being held in other cities, alternating between larger and smaller places, and between locations in the eastern States and in the west and south.

FRANK THONE.

The Standardisation of Insulin.

THE position which insulin holds in clinical medicine in the treatment of diabetes would never have become so firmly established if the manufacture of the product had not been controlled. The appearance on the market of preparations of varying potency, perhaps even inactive, would have led to a great delay in the recognition of the usefulness of this compound, perhaps even to a certain amount of scepticism as to its actuality. To control production adequately, then, meant the discovery of a method by which the activity of different samples could be accurately compared and expressed in terms of some known standard. The latter was, and is still, defined in terms of the blood-sugar reducing power of insulin, after injection subcutaneously into normal rabbits. Thus one rabbit unit is that amount of insulin which will reduce the blood-sugar of a 2 kilo. rabbit, starved for twenty-four hours, to the convulsive level of 0·045 per cent.: a clinical unit is one-third of this amount and is the unit which is now generally used. The problem of putting on the market samples of insulin of known and unvarying potency has been simplified by the issue, to those manufacturing the product, of a solid powder (the hydrochloride of insulin), the activity of which has been determined by the authorities controlling the manufacture: this standard powder is now in use in different countries, so that all samples produced should be of the same activity. But this, of course, depends upon the accuracy of the assay of the sample against the standard.

Methods of estimating the activity of insulin preparations have been developed utilising both the blood-sugar reducing property and also a secondary result of this property, the production of convulsions on doses which reduce the blood-sugar to levels of 0·045 per cent. or lower. Owing to the fact that the occurrence of convulsions in a group of animals is much less regular than a fall in the blood-sugar after a dose of insulin, to obtain consistent results very large numbers of animals must be used, either rabbits or, perhaps more conveniently, mice. But even utilising the first method, complications arise from the fact that different animals react very

differently to the same dose of insulin on the same day, and the same animal shows definite variations to the same dose on different days. A method, therefore, which tends to eliminate such variations increases the accuracy of the assay; the "crossover" test described by H. P. Marks (*Brit. Med. Journ.*, 1925, vol. 2, p. 1102) appears to a great extent to fulfil this condition. Rabbits of about 2-3 kilo. in weight are used, those which convulse on one unit per kilo. or are abnormally insensitive having been previously eliminated from the stock. The principle of the method is to divide the rabbits into two groups, of which one is given a dose of standard and the other a dose of the sample, and then to repeat the test a few days later, reversing the doses given to the two groups. In this way variations affecting the whole of the rabbits, the bulk daily variations in sensitiveness, are eliminated entirely, or almost entirely, since different rabbits may respond somewhat differently to these bulk variations; moreover, by using a large enough number of animals, it is possible to eliminate to a great extent the individual variations, which may be in the direction of either increased or decreased sensitiveness, since these variations may be supposed to cancel out.

The details of the actual test are as follows: the rabbits, at least six, preferably twelve or even more, are starved for the twenty-four hours preceding the test. On the morning of the test, blood is drawn from an ear vein of each rabbit, and then half are given a dose of standard corresponding to 0·5 unit per kilo. subcutaneously, and the other half a dose of the sample, which is assumed to be of about the same value. Blood is drawn from the ear every hour after the injection for five hours, by which time the blood-sugar has usually returned to its initial level. A little more than 1·0 c.c. of blood is drawn at each bleeding, the blood-sugar being estimated by the Shaffer-Hartmann method. The average value for the blood-sugar over the five hours after the injection is found and subtracted from the initial value: the result, expressed as a percentage, is known as the "percentage reduction" of the blood-sugar. After at least three days the test is repeated on the same group of rabbits, starved for the preceding twenty-four hours, but the rabbits which previously had a dose of the standard are now given a dose of the sample, and vice versa. The sum of all the percentage reductions on the sample is now compared with the sum of those obtained on the standard, the result being expressed as a percentage of the latter. When the sample has a strength of about 100 per cent. compared with the standard, the standard error is about 2·5; trial of the method with known doses of standard tested against 100 per cent. standard showed that the effect produced tended to be closer to the 100 per cent. than the actual dose given: thus a dose of standard 110 per cent. against standard 100 per cent. gave a result of 106 per cent., whilst a dose of 80 per cent. appeared to be 83 per cent.; moreover, the standard errors with these two doses were 3·7 and 6·3 respectively. From the figures given it is possible to calculate the actual strength of a solution of insulin with a fair degree of accuracy, to make the appropriate change in its strength to bring it to 100 per cent. and, on retesting, to feel fairly confident that the result obtained will agree, within about 5 per cent., with the result expected.

Do insulin solutions of somewhat varying potency, assayed in the laboratory on *normal* rabbits, show parallel variations in potency when used clinically on *diabetic* patients? According to G. A. Harrison and R. D. Lawrence, in a continuation of the same paper (p. 1104), this is now the case. Although in the early days of insulin testing variations in the activity of different samples of insulin could be detected clinically, and clinical results did not agree always with those obtained in the laboratory, during last year the laboratory tests agreed very closely with the clinical tests, so that the authors conclude that the method of assay above described gives results which are perfectly satisfactory for determining the potency of solutions to be used clinically. In the performance of the clinical tests strict adherence to diet and daily routine is essential: the two samples of insulin are given on successive days and the resultant falls in the blood-sugar plotted as superimposed graphs: if the curves show a reasonable coincidence, the samples are considered to be of the same strength; if one appears stronger than the other, the test is repeated later, using doses which are more nearly comparable. It should be emphasised that small differences in the strength of different batches will not be detected clinically unless the patient's whole daily routine is kept absolutely constant. The authors consider that variations of 10 per cent. from the standard will not be inconvenient clinically: as has been seen above, the method of assay worked out by Marks is capable of determining even smaller differences.

The Lines of the Solar Spectrum.

AN important paper by K. Burns and W. F. Meggers, dealing with the wave-lengths of lines in the solar spectrum, appears in Vol. 6, No. 7, of *Publications of the Allegheny Observatory*. In order to investigate a number of problems connected therewith, the Allegheny Observatory co-operated with the Bureau of Standards, Washington, the observations being made at the former institution and the measurements jointly. The problems dealt with in the present paper are the errors in Rowland's measurements of solar wave-lengths over a limited range of spectrum, and a preliminary study of the relative wave-lengths of lines in the solar and terrestrial spectra. An image of the sun was formed in a Fabry-Perot interferometer by a lens of 40 cm. focal length. The issuing light was focussed by a quartz-fluorite achromatic lens on the slit of a spectrograph containing a Michelson grating having 500 lines per mm. and giving a dispersion of 3·65 Å.U. per mm. in the first order. The resulting spectrum therefore appeared as a number of line images of the slit, each crossed by segments of the interference ring system, the centre of which coincided with the centre of the spectrum line. Special attention was given to a disturbing interference effect which disappeared when the slit width was properly adjusted, and the paper contains a useful discussion of the interference phenomena associated with a continuous spectrum.

The wave-lengths were measured by comparison with those of standard lines of neon. Light from a neon lamp was reflected through the same apparatus by means of a half-silvered diaphragm placed before the interferometer, and the neon lines, crossed by rings, were photographed in an auxiliary camera of shorter focus. The thickness of the interferometer (ranging, in separate experiments, from 3·75 mm. to 10 mm.) was computed from the neon lines, and the solar wave-lengths were thereby calculated. A table gives the wave-lengths of 201 lines in the region $\lambda 4754 - \lambda 4073$ and the corrections to be applied to