from strain of a block after a certain heat treatment. The essential condition is the accurate measurement of the upper temperature at which strain in the glass block is released in a reasonably short space of time.

Research on methods of testing the resistance of polished glass surfaces to atmospheric attack has led to the abandonment of the old autoclave test of superheated steam at four atmospheres pressure. The abnormality of the conditions of this test must make the results open to doubt, and it has been found that the modified method of testing in water-vapour at atmospheric pressure and a temperature of 80° C. gives results more in accordance with general experience, although the period of the test has to be increased from two hours to two weeks. The revised method of testing puts the various types of optical glass in a different order as regards resistance to surface attack, some of the types previously thought unstable from the results of the autoclave test now being shown to be perfectly reliable, while certain other types previously thought of fair durability are now shown to be very unstable, confirming the experience of the lens manufacturer.

The table on p. 927 shows the classification of representative types of optical glass according to the autoclave and atmospheric durability tests.

Among the new types which have been successfully produced in recent years is a dense barium flint made of ${}^{n}D$ 1·6437, ${}^{n}C - {}^{n}F$ 0·01332, V 48·3, which is as extreme a member of the flint series as the barium crowns are in the crown series. The very heavy lead glasses of ${}^{n}D$ up to 1·8 are now produced in large blocks of a degree of homogeneity and freedom from colour never previously attained, this being largely due to the use of the new refractories and correct temperature control in melting.

[1] "Proceedings of the Optical Convention", 1926.
[2] Brit. Pat. 325,386 (1929), Chance Brothers and Co., Ltd., and J. English.

Obituary.

DR. S. W. STRATTON.

SAMUEL WESLEY STRATTON was born at Litchfield, Illinois, in 1861. He graduated in 1884 from the University of Illinois, where he remained for the next eight years, at first as an instructor, then as professor of mathematics, and finally as professor of physics and electrical engineering. In 1892 he became assistant professor of physics and later professor in the University of Chicago. Nine years afterwards he was invited by the Assistant Secretary of the Treasury to formulate a project for the development of work on weights and measures, and in 1901 was mainly responsible for the Act which established the Bureau of Standards at Washington. Of this he became the first director, retaining the position until 1923, when he was appointed president of the Massachusetts Institute of Technology. He had a lifelong connexion with the American Navy, and in 1898 served during the Spanish American War. This brief summary of his activities shows that the most important part of his work was connected with the Bureau of Standards, which is indebted to him for its existence and for many of its most striking developments.

Stratton was a welcome visitor to the National Physical Laboratory, and spent some time at Bushy House in early years; from this time on the connexion between the two institutions has been a close one. Visitors to the National Physical Laboratory will remember an old chestnut tree near the door of Bushy House, said on good authority to have been planted by Charles II. Round the Bureau of Standards, when founded, was a wood of chestnuts; the site was part of Washington's estate, and tradition says that, after one of his visits to England, Washington took back the chestnuts which formed the nucleus of this wood.

An Electrical Congress, in connexion with an International Exhibition, took place at St. Louis in 1904 and proved to be Stratton's introduction to that international work which for the rest of his life occupied much of his time. This Congress passed two important resolutions: one in favour of a formal International Conference to deal with electrical units, the other inviting the leading technical societies of the world to co-operate in the standardisation of electrical machinery; the first led to the International Conference on Electrical Units in London in 1908, the second to the establishment of the International Electrotechnical Commission.

After the St. Louis Conference, at which I represented the British Government, I spent some time with Stratton at Washington discussing with him, much to my own profit, questions of laboratory organisation suitable for any institute such as those we directed respectively. In 1905 he became a member of the International Committee of Weights and Measures and, as a result, a frequent visitor to this side of the Atlantic

The International Electrical Conference foreshadowed at St. Louis was summoned by the British Government and met in the rooms of the Royal Society in October 1908. Stratton was prominent among the American delegates; he was accompanied by Dr. E. B. Rosa, who had done much valuable work at the Bureau on electrical units.

A distinction had been drawn at the Chicago Electrical Congress, some years previously, between the ohm, the ampere, and the volt, multiples of the C.G.S. units, and the International Ohm, Ampere, and Volt taken to be close approximations to the absolute units, and defined in a manner which it was hoped would permit their realisation with sufficient accuracy for all practical purposes in any fully equipped laboratory. Some of the American delegates would have preferred definitions based only on the C.G.S. units.

The Conference also passed a resolution recommending the various governments interested to establish a permanent International Commission for Electrical Standards and, pending the appointment of this, requested its president, Lord Ray-

leigh, to nominate a committee to advise as to its constitution and to direct such work as might be necessary in connexion with the maintenance of standards. It was suggested that the functions of the International Conference of Weights and Measures might be enlarged with the view of some combination of effort. The Electrical Conference was of opinion, however, that the Permanent Electrical Commission should be a distinct body.

Stratton was closely concerned in the consequences which followed from these two resolutions and took an active part in the development of each. He was a member of Lord Rayleigh's Committee, and in connexion with the maintenance of standards invited representatives of the Reichsanstalt, the Laboratoire Centrale d'Électricité, and the National Physical Laboratory to meet at the Bureau of Standards in 1910 and complete the work, left incomplete in 1908, of preparing specifications for the standards. The representatives (Dr. E. B. Rosa and Dr. Wolff, Dr. W. Jaeger, Prof. F. Laporte, and Mr. F. E. Smith) met at Washington and worked together during a large part of 1910; their report, "On the Concrete Standards of the International Electrical Units", was issued in January 1912 and has formed up to the present the basis of international co-operation. Dr. Stratton undertook the duties of treasurer of Lord Rayleigh's Committee and collected funds to meet the cost of this joint investigation from certain American societies interested in electrical matters.

The establishment of a Permanent International Electrical Commission was a more difficult matter. The International Conference of Weights and Measures was established to give effect to the resolutions adopted in 1875 by the Metric Convention. The Conference dealt solely with standards of length and mass. To these had been added, as a necessary outcome of accurate measurements of length and mass, the standardisation of a limited range of temperature. A committee of the Conference guided the work of the Bureau International des Poids et Mesures at Sèvres, and Stratton had been a member of this committee since 1905. He believed that the enlargement of the functions of the Conference offered the best solution of the problem of establishing an International Electrical Commission.

After his retirement from South Africa, Sir David Gill became the British representative on the Conference of Weights and Measures, and Stratton found in him a congenial colleague and a cordial supporter, but 1914 prevented the immediate realisation of his ideas. This, however, was achieved, not entirely in the manner originally suggested, in 1927, when the Committee of Weights and Measures adopted the following resolution, ratified later by the Conference: "The International Committee of Weights and Measures approves the organisation of a Consultative Committee for Electricity to advise the International Committee of Weights and Measures on questions relating to systems of Measurement and Electrical Standards". That Committee is now in being and has already done valuable work; the International Committee of Weights and Measures has become the central organisation for the issue of electrical standards. For this purpose it works in close co-operation with the national standardising laboratories, and the standards it proposes to issue will be based on the comparison and co-ordination of the results of these laboratories. At the meeting of the Conference held during the current year, at which Dr. Stratton was present, photometric standards were brought within the ambit of the Committee.

International standardisation did not by any means include the whole of Stratton's work. Since the War, standardisation has been much to the fore in the United States as elsewhere, and Stratton has been a leader on many of the committees dealing with engineering matters. He was a member of the National Screw Thread Commission, and all who have had occasion to study the report of that Commission have appreciated the thoroughness with which its work was done and the value of its results. Stratton was himself a very skilful mechanic. He also served on the National Research Council and on the Advisory Committee for Aeronautics, which under the guidance of Dr. Ames has done much to secure to America a leading place in the scientific study of aviation problems.

Stratton's friends in England welcomed him recently as a delegate to the British Association, Faraday, and Clerk Maxwell centenary meetings in London and Cambridge. These he enjoyed greatly. We met at the National Physical Laboratory and discussed old times, and again at Cambridge, by chance in a bookshop where he was collecting literature relating to Maxwell, as well as during the meetings themselves. He was a guest at Caius College, much impressed by the advantages of college life and the kind hospitality of his hosts.

The end came on Oct. 19, soon after his return to Boston—"No warning, not a moment's illness—just fell forward while talking, that's all" are the words of a letter telling me about it.

R. T. GLAZEBROOK.

MR. ELSDON BEST.

ELSDON BEST, doyen of Polynesian ethnology, died at Wellington, New Zealand, last September. He was born in 1856 at Porirua and had little schooling, but was from his earliest years associated with the Maori population. At eighteen years of age he was in the Poverty Bay district, then emerging from the shadow of Te Kooti's massacres, working in the bush on fencing and felling contracts. He joined the armed constabulary for the, as it turned out, bloodless campaign against Te Whiti, the latter part of his service being in control of a party of 'friendlies' in the bush. In 1883 he went to Honolulu, later moving on to California, engaging in timber work among the redwoods of the Sierra Nevada. He then moved east into Arizona, New Mexico, Texas, and Louisiana, working as a cowboy and as foreman in railroad construction. At the end of 1886 he returned to New Zealand and entered on the period of twenty-five years' intimate connexion with the Maoris which furnished him