verbaux for 1892, p. 147). The report clearly points out that the difficulty in reducing the uncertainty in the measurement by this method to even the amount here attained, 2cg. per kg. (2 in 100 000), lies mainly in the impossibility of obtaining by linear measurements the true volume of the cylinder.

Although the liter was originally defined as having the volume of one cubic decimeter, yet the International Bureau, in 1880, deemed it best to adopt as a provisional re-definition, the volume of one kilogram of water at 4° C., its temperature of maximum density. This was necessary for three reasons; first, the adoption of the platinum kilogram instead of the mass of the cubic decimeter of water at 4° as the standard of mass; second, the uncertainty as to the exact relation between the kilogram and the mass of the cubic decimeter of water; and third, the fact that the great majority of scientific measurements of volume or capacity are made by weighing the volume of water displaced or contained by the space to be measured. The scientific fraternity has unanimously adopted this practice. It is, therefore, pleasing to know from the above cited investigation that the discrepancy between the liter, as thus redefined, and the cubic decimeter, is but 5 parts in 100,000, or one two-hundredth of one per cent. No revision of past work and no correction of future results is, therefore, necessary where an error as large as one one-hundredth of one per cent. is unimportant; and this covers all engineering and the vast majority of scientific measurements. For work of an accuracy not exceeding one one-hundredth of one per cent. we may assume the volume of one gram of water at 4° C. to be one cubic centimeter, and the liter to be equal to the cubic decimeter. If the greatest possible accuracy is requisite, then we must add 5 parts in 100,000 to the volume as thus computed. So corrected, the results will probably be trustworthy within 2 parts in 100,000.

The following data, computed from the above specific mass of water, and from the relation, 1 inch = 2.54 000 $\overline{5}$ centimeters, derived from the Bureau's comparisons of yard and meter, are convenient:

One gram of water at 4° C. has a volume of 1.00 005 cc. (± 0.00 002 cc.).

One cubic foot of water at 4° C. (39.2° Ft. has a mass of 62.4252 lbs. (± 0.0012 lbs.).

One cubic inch of water at 4° C. has a mass of 252.880 grains (± 0.005 grains).

S. W. HOLMAN.

BOOKS RECEIVED.

System der Bakterein. W. MIGULA. Jena, Fischer. 1900. Pp. x + 1068. 18 Plates. Mark 30.

Practical Exercises in Elementary Meteorology. R. DEC. WARD. Boston, Ginn & Co. 1899. Pp. xiii + 199.

A Century of Science and other Essays. JOHN FISKE. Boston and New York, Houghton, Mifflin & Co. 1899. Pp. vii + 477. $2.00.

SCIENTIFIC JOURNALS AND ARTICLES.

Journal of Physical Chemistry, November. 'Thermal Coefficients,' by J. E. Trevor; 'On the Theorems of Robin and of Moutier,' by Paul Saurel—both mathematical papers; 'Hydrates in Solution,' by Wilder D. Bancroft, a criticism of Nernst's deduction that the percentage of hydrated substance in a dilute solution is independent of the concentration.

Bird Lore for December brings the first volume to a close. Witmer Stone contributes an interesting description of 'A Search for the Rudy Island (N. J.) Crow Roost,' and W. E. Cram, 'Winter Bird Notes from Southern New Hampshire.' A. A. Crolius tells 'How the Central Park Chickadees were Tamed,' and under the caption 'The Surprising Contents of a Birch Stub,' Frank M. Chapman describes a family of Chickadees, while P. B. Peabody furnishes two pictures of 'Richardson's Owl,' with accompanying text. The most important article, 'Humanizing the Birds,' by Caroline G. Soule, is a timely protest against ascribing to the birds human qualities that they do not possess. There are numerous notes, reviews and reports from Audubon Societies.

The Osprey for November commences with an article on the 'Breeding of the Fish Crow in Pennsylvania,' by Frank L. Burns, and this is followed by a short account of 'Dusky, or Some Traits of a Canary Bird,' by Miriam Zieber. The main paper is a reprint of a very interesting

description of 'The Shearwaters and Fulmars as Birds and Bait,' by J. W. Collins. W. P. Lemmon describes a 'Nest of Duck Hawks in New Jersey,' and the balance of the number is filled with notes and reviews.

THE Macmillan Company announces that it will commence the publication on January 1st of the *International Monthly*, a magazine of contemporary thought edited by Mr. Frederick A. Richardson with a distinguished advisory board. The magazine proposes to give in each number a comparatively few articles of considerable length, and science is to have a prominent place. Thus the five articles in the first number include, 'Influence of the Sun on the Formation of the Earth's Surface,' by Professor N. S. Shaler, and 'Recent Advance in Physical Science,' by Professor John Trowbridge. The members of the advisory board as it is thus far organized are:

History: J. H. Robinson, Columbia University; George Monod, College of France; Karl Lamprecht, University of Leipsig.

Philosophy: Josiah Royce, Harvard University; Xavier Léon, Paris; Paul Natorp, Marburg University; George F. Stout, Oxford.

Psychology: Edward B. Titchener, Cornell University; George F. Stout, Oxford; Th. Ribot, Paris; Oswald Külpe, Leipsig University.

Sociology: Franklin H. Giddings, Columbia University; Gabriel Tarde, Paris; Georg Simmel, Berlin University; J. S. Mackenzie, Cardiff, Wales.

Comparative Religion: C. H. Toy, Harvard Universversity; Jean Réville, College of France; F. B. Jevons, University of Durham; C. P. Tiele, University of Leiden; Ths. Achelis Bremen.

Literature: William P. Trent, University of the South; Richard Garnett, London; Gustave Lanson, Paris; Alois Brandl, Berlin University.

Fine Art: John C. Van Dyke, Rutgers College; Georges Perrot, Paris University; Adolph Fürtwangler, Munich University.

Biology: Charles O. Whitman, University of Chicago; Raphael Blanchard, College of France; E. B. Poulton, Oxford University; Wilhelm Roux, Innsbruck University.

Medicine: D. B. St. John Roosa, Pres. Graduate School of Medicine; Sir Thomas G. Stewart, University of Edinburgh; Leop. Panas, College of France; Carl Von Noorden, Frankfurt a. M.

Geology: Joseph Le Conte, University of California; Sir Archibald Geikie, London; Hermann Credner, Leipsig University.

Departments of Physics and Industrial Arts are to be added.

THE October number of the *Kansas University Quarterly* contains a list of the scientific publications of the faculty and students of the State University. This list, which numbers some 800 books and papers, includes only those publications on natural and physical science and mathematics.

SOCIETIES AND ACADEMIES.

THE NEW YORK ACADEMY OF SCIENCES. SECTION OF ASTRONOMY AND PHYSICS.

AT the meeting of the Astronomy and Physics Section of the New York Academy of Sciences, on Monday evening, November 6, 1899, Professor J. K. Rees, of Columbia University, gave a lecture, illustrated by lantern views, on 'November Meteor Showers.' Among other things, the speaker said that one of the theories of the origin of some meteors was that they were at some time ejected from the sun or moon, earth, or other planets, by volcanic explosions, and if from the earth, they traveled in an orbit that intersected that of the earth. The later theories which identify meteor streams with comets or the remains of comets, seem most satisfactory. Those meteors which reach the earth have a large percentage of nickel in their composition, and show when they are polished, a peculiar and characteristic crystalline structure. A great many of these meteors reach the earth on an average each day, as many as ten million or more, it has been estimated. Interplanetary space is full of them. During the meteor showers, this number is greatly increased. During the shower of 1833, at one place on the earth as many as 240,000 were estimated to have been visible during eight hours.

Historical records seem to show that showers of meteors have been seen at intervals of thirty-three years in the fall of the year for some time back. In 1799 Humboldt saw one from the Andes Mountains. In 1833 there was another. Professor H. A. Newton of Yale, after investigating the subject, predicted another in 1866,