SCIENCE

FRIDAY, DECEMBER 15, 1899.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

REMINISCENCES OF BUNSEN AND THE HEIDELBERG LABORATORY,

1863–1865.

I FIRST met Bunsen in the lovely, retired valley of Engelberg, Switzerland, during the summer of 1863; I had spent the preceding twelve months in Paris, working in Dumas' laboratory at the Sorbonne, and in the *École de Médecine* under Wurtz, and was expecting to continue my studies in Heidelberg. Learning by accident that Bunsen was at an adjoining *Gasthaus* I called on him and told him of my plans; he received me graciously and immediately won my heart by his affability, by the charming smile that lit up his large features, and by his unselfish interest in my personal affairs. Being myself quite ignorant of the German language we conversed in French, and he gave me useful hints as to the opening of the University laboratory.

My first *semester* at Heidelberg was devoted almost exclusively to laboratory work, but I attended Bunsen's lectures on general chemistry every morning at nine o'clock in the adjoining auditorium. Bunsen's habit of saying one word when he meant to use another was at first puzzling, particularly as I was very weak in German, but when he exhibited the violet vapor of iodine and called it chlorine, my previous knowledge of chemistry assisted comprehension. After every lecture Bunsen rarely missed spending several hours in the laboratory, going

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