stretching of the stipe at times when light can be used as a directive influence.

One of the most interesting discoveries recorded in the book is that with reference to the ejection of the spores from the sterigmata. It is found that the spores may be expelled ten to thirteen times their own length and that they fall from the gills in a peculiar curve that Buller calls "sporabola." The emission of a powder from polyporoids had been seen before, but as a very rare occurrence. It has remained for Buller to devise by means of a beam of light a method of determining readily whether spores are being discharged or not. Then by observing some mature spores on a section of a gill, he was able to determine that the spores were actually projected, although the actual flight through the air could not be seen. This ejection is independent of hygroscopic conditions, takes place but slowly at 0°, and is stopped by anesthetics and by lack of oxygen. It is therefore a phenomenon of protoplasmic activity, not a mere result of hygroscopic tension.

For the Basidiomycetes the hypothesis is advanced that the discharge of spores is similar to the jerking process described for *Empusa* by Nowakowski. It involves the mutual bulging of the walls of the sporidia and the sterigmata, in opposite directions.

On the side of physics, Buller pushes the matter to a fine point, determining the specific gravity of spores by floating them in different strengths of $CaCl_2$ (allowing for plasmolysis) and also determining the rate of fall in the air. The latter was an attempt to verify Stokes's law on the fall of microscopic bodies. The results show a velocity 50 per cent. greater than the computed rate.

In Part II., the spore dispersal of the Ascomycetes is considered. Here the observations of the author lead him to conclude that the explanation of deBary which attributes the expulsion of spores to mere loss of water does not explain the phenomenon of "puffing." In general Buller is led to believe that the "puffing" is caused by a stimulus given to the protoplasm in contact with the ascus lid.

Some of the interesting points in the book are: (1) The descriptions of the new Poynting's Plate Micrometer, (2) the figures on the increase of hymenial surface due to gills, (3) the number of spores per sporophore, (4) the specific gravity of various spores, (5) the effect of electric charges on different spores, (6) the persistence of vitality in certain xerophytic species, (7) the summary showing the present status of the work on the nuclear phenomena in the Basidiomycetes and (8) the problems suggested with reference to the relation of insects and spores.

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Experimentelle Untersuchungen über Atomgewichte. Von Th. W. Richards und seinen Mitarbeitern 1887–1908. Deutsche Ausgabe von J. Koppel. Pp. viii + 890. Hamburg und Leipzig, L. Voss. 1909. Preis M. 35.

Theodore William Richards occupies in our time, with regard to the precise determination of atomic weights, the place which was occupied in the first half of the past century by Berzelius and in the second half by Stas. And just as Stas, in his memorable investigation of the atomic weight of carbon, carried out jointly with Dumas, demonstrated the necessity of a new and independent study of the entire problem by his discovery of a not inconsiderable error in the atomic weight found by Berzelius, so Richards proved the necessity of his own researches by demonstrating the inexactness of Stas's fundamental value for silver. However, there is also a deep-seated difference between the two achievements: the older discovery was made at the beginning of the new period, and was exploited by Dumas in his usual highly dramatic fashion; while Richards was almost forced, by a series of mutually corroborating deviations, to abandon the older value, at first regarded by him with complete confidence, and to accept his own unexpected result. This says: Dumas was a thinker of the romantic type, while Richards is a classic, just as Berzelius and Stas were classics. Indeed, atomic weights can be successfully determined only by a classic. Witness Dumas, who undertook it in

spite of his unsuited type of mind, found nothing but false values, although he devoted a long period of time to the determinations and used only the simple silver titration method.

Thus far the instinctive talent for avoiding methodical errors, which is clearly the characteristic of Richards's gift, has guided him so surely that no such errors have as yet appeared in his measurements extending over a period of over twenty years. Obeying his measuring instinct, Richards abandoned the method of working with large quantities, in which his celebrated predecessor Stas saw the greatest advantage, and returned to working with quantities of a few grams. The absolute errors of weighing, which led Stas to use large quantities, are so insignificant by the side of all other possible errors that the use of large quantities, with the complications of apparatus and preparative method arising from it, really introduces more errors than it eliminates.

A distinctive trait of the researches of this American investigator lies in his elegant simplicity of means. Just as Penny, in his time, carried out his masterly determinations with the simplest imaginable means, and yet attained a precision surpassing everything that his contemporaries had attained, so Richards shows us that refined complications of apparatus can mostly be dispensed with, if one only thinks a little longer over his problem before undertaking its experimental execution, and reduces the work to its simplest and most transparent form by first experimenting with the head.

As an instance of this I will mention only the simple device for closing a weighing tube *within* the apparatus in which the reaction takes place. This device has rendered possible the handling of many halogen compounds and other hygroscopic substances whose weight would be vitiated to an undeterminable extent by exposure to the air.

And so the study of these researches will be an excellent school for every nascent investigator whose heart's desire it is to learn to work precisely.

In conclusion, it is a satisfaction that this remarkable collection has been published in Germany and in the German language. With us, the publication of such a book is a pleasant enterprise for the publisher and involves no particular risk; in America no publisher could apparently be found who thought that there was "money in."[1]

WILHELM OSTWALD[2]

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Biological Chemistry, Vol. VIII., No. 1, issued July 19, 1910, contains the following: "The Hæmocyanin of *Limulus Polyphemus*," by C. L. Alsberg and E. D. Clark. The hæmocyanin from the blood of *Limulus* differs from that from the blood of *Octopus* in percentage composition and in various of its reactions. This fact shows that there are different hæmocyanins and that homologous proteins in different animals are not identical. "On the Preparation of Cystin," by Otto Folin. A convenient and rapid method for obtaining cystin in bulk. "Experiments Relating to the Mode of Decomposition of Tyrosine and of the Related Substances in the Animal Body," by H. D. Dakin. Experiments are described which do not support the view that homogentisic acid is a normal intermediary product in the catabolism of tyrosine and phenylalanine, and which show that this acid is not formed in the body from tyrosine by reactions similar to those which obtain in the oxidation of *o*- or *p*-hydroxybenzaldehyde by hydrogen peroxide. "The Fate of Inactive Tyrosine in the Animal Body together with Some Observations upon the Detection of Tyrosine and its Derivatives in the Urine. The Synthesis and Probable Mode of Formation of Blendermann's Para-hydroxybenzylhydantoïn," by H. D. Dakin. These experiments throw doubt upon the probability of the formation of either *p*-hydroxyphenyl-α-uramidopropionic acid or *p*-hydroxybenzylhydantoin in the metabolism of tyrosine. "On

[1] The translator leaves this as in the original.

[2] Translated by M. A. Rosanoff, from the German in the *Zeitschrift für physikalische Chemie*, Vol. 72, p. 759, 1910.