we obtained our results from "the same identical preparations." Montgomery never saw my preparations, nor I his. For a minor part of his work he used some material from the same individual I had worked on, but this material had been standing in alcohol some two years before he obtained it from me, so that it is to be expected that he would not get as clear-cut preparations as from freshly fixed material, to say nothing of the fact that fixation may have been unequal in different bits of the tissue.

Concerning the question of sex chromosomes in fowls, I may say that in my opinion the final word has by no means yet been said. I hope in the near future to contribute some further evidence in the matter.

M. F. Guyer

SCIENTIFIC BOOKS

Chemistry in America. Chapters from the History of the Science in the United States. By Edgar F. Smith, Blanchard Professor of Chemistry, University of Pennsylvania. Illustrated. New York and London, D. Appleton and Company. 1914. Pp. xiii + 354. Price $2.50.

In his preface the author says: "The writer has lectured for several years to his graduate students on the development of chemistry in the United States. A mass of material has been collected, most of which is not only interesting but valuable. Repeated requests have been made for the publication of these facts as a history of chemistry in the United States. To the writer's mind the information in his possession is not sufficiently complete to warrant such an important undertaking. The earliest endeavors of our country's scientists require even more careful and extended research."

The earliest contribution to chemistry from this country appeared September 10, 1767, in the *Transactions of the American Philosophical Society.* The title is "An Analysis of the Chalybeate Waters of Bristol in Pennsylvania." The author is Dr. John de Normandie. Liberal quotations from the article are given which show that the author used the balance. Then follow quotations from an article by James Madison, who was professor of chemistry and natural philosophy at William and Mary College as early as 1774, and from an article by Dr. Robert McCauslin. The author of the book thereupon remarks: "These communications testify to a spirit of inquiry, at least, on the part of our early devotees to science. They are, further, interesting in that they show the use of the balance as early as 1768 and indicate the steps of analysis."

In 1792 the Chemical Society of Philadelphia was founded by James Woodhouse. The fact is noted that the members of this society favored Lavoisier's doctrine of combustion.

According to Dr. Smith "the arrival of Joseph Priestley in America in 1794, and his frequent presence among the men of science of that day, greatly stimulated scientific studies." But Priestley's thoughts appear to have been on theological subjects fully as much as on scientific in these latter years of his life. He was elected professor of chemistry in the University of Pennsylvania in 1794 but felt obliged to decline the honor. In a letter to Dr. Rush in regard to this he says: "Nothing could have been so pleasing to me as the employment, and I should have been happy in your society, and that of other friends in the capital, and, what I have much at heart, I should have an opportunity of forming an Unitarian congregation in Philadelphia."

Thomas Cooper, professor at Dickinson College and afterwards at the University of Pennsylvania, was the first one to make metallic potassium in this country. He was also the editor of Thomas Thomson's "System of Chemistry." From 1820 to 1834 he was president of the College of South Carolina, "attaining distinction as an extreme advocate of the States' Rights doctrine during the nullification period."

Robert Hare, who was born in Philadelphia in 1781, was without doubt the most influential chemist of his time in America. In 1801, when he was only 20 years old, he communicated to the Chemical Society of Philadelphia a description of the oxy-hydrogen blowpipe which

afterwards came to be known as the compound blowpipe. The communication is entitled "Memoir of the Supply and Application of the Blow-pipe, Containing an Account of the New Method of Supplying the Blow-pipe either with Common Air or Oxygen Gas; and also of the Effects of the Intense Heat Produced by the Combustion of the Hydrogen and Oxygen Gases." Of this Dr. Smith justly remarks, "It is a real landmark in scientific discovery."

Hare later became professor in the University of Pennsylvania which position he held until his resignation in 1847.

Due reference is made to Benjamin Silliman, John P. Norton, Evan Pugh, Robert E. Rogers and Theodore Wormley. James C. Booth is spoken of as probably the first American to study analytical chemistry in Germany. "With an education probably unequalled at that time by any chemist in America, he returned to the United States, and, in 1836, established in Philadelphia a laboratory for instruction in chemical analysis and applied chemistry."

Of T. Sterry Hunt (1826–1892) the author speaks as "an active participant in the upbuilding of chemistry in America." J. Lawrence Smith (1818–1883) was active about the same time. His paper on a method of analyzing silicates by the use of calcium carbonate and chloride "was a very valuable contribution to analytical methods."

Frederick A. Genth (1820–1893) was a German by birth. He came to this country in 1848. After "conducting a laboratory for commercial analysis and the instruction of special students in chemistry, he became professor of chemistry in the University of Pennsylvania in 1872.

"His earliest contributions were upon geological subjects. Later he devoted much time to mineralogical problems. The chemical research by which he is best known relates to the ammonia cobalt bases (the cobaltamines) developed jointly with Wolcott Gibbs. His original memoir was published in 1851 and contained the first distinct recognition of the existence of perfectly well defined and crystallized salts of the ammonia cobalt bases. The joint monograph of Genth and Gibbs appeared in 1856. This elaborate and extended research has always stood among the finest chemical investigations ever made in this country."

"Wolcott Gibbs (1822–1908) for years held the most commanding position among the chemists of the United States."

"It was Gibbs's peculiar merit, that he, more than any other man, introduced into the United States the German conception of research as a means of chemical instruction."

His investigations covered a wide range of subjects in organic, analytical, organic and physical chemistry. "It was in the great research upon the ammonia cobalt bases, to which reference has already been made, that Gibbs finally found himself."

His most important contribution to analytical chemistry was the electrolytic determination of copper now universally used. "The entire field of electro-analysis was thus thrown open by him." His remarkable series of researches upon the complex inorganic acids, the publication of which began in 1877, continued well into the 'nineties.

Gibbs undoubtedly exerted a powerful influence upon the development of chemistry in this country. His sympathy with young men, his enthusiasm, his absolute fidelity to the highest ideals deeply affected many a young worker and helped to hold him on a true course.

Others whose work is discussed in the book before us are Albert Benjamin Prescott, Samuel W. Johnson (1830–1909), a pioneer in agricultural chemistry, John W. Mallet (1832–1912) of the University of Virginia, M. Carey Lea (1823–1907) and Josiah Parsons Cooke (1827–1894) of Harvard.

The book closes with some account of J. Willard Gibbs (1839–1903) of Yale, whose contributions to physical chemistry "are fundamental in nature and of broad application."

Dr. Smith has wisely refrained from speaking of those who are still alive. In conclusion he says: "It is not the writer's purpose to discuss the investigations which have come from the many working centers of the United

States during recent years, that story awaits another narrator; but, if only a desire, on the part of Americans to learn more concerning the place which American chemists occupy in the world's history of chemistry, is awakened, this compilation of facts will not only have been a pleasure but it will have served a worthy purpose."

The book is to be regarded as a "compilation" and not as a history. All American chemists should be thankful to the author for the pains he has taken to collect this material and for placing it before us. It furnishes the basis for the history of chemistry in America which remains to be written.

It is interesting to note the fact that so many of those who are necessarily mentioned in the book were connected with the University of Pennsylvania. It is, therefore, most appropriate that this work of compilation and comment should have been done by the one who at present holds the two important positions in that university of provost and professor of chemistry.

Ira Remsen

Das Relativitätsprinzip. By Lorentz, Einstein and Minkowski. Leipzig: B. G. Teubner. 1913. Pp. 89.

Under the general title Fortschritte der mathematischen Wissenschaften in Monographien, Otto Blumenthal is issuing a series of which number 2 is a collection of six papers by eminent advancers of mathematical physics dealing with relativity.

The first paper is a short note by Lorentz of date 1895 in which the hypothesis of shortening in the direction of motion is discussed, practically for the first time, though both he and FitzGerald had for some time been familiar with it. The second is a translation of Lorentz's very famous Electromagnetic phenomena in a system moving with any velocity smaller than that of light, dated 1904. Here not only the hypothesis of shortening, but the Lorentz group, fundamental in relativity theory, is found.

The third article is Einstein's epochal formulation (1905) of the principle of relativity as a fundamental physical principle independent of any hypothesis of shortening. He goes right at the heart of the matter in that direct way which has been so characteristic of his theories. The next is a short note, not two and one half pages, in which Einstein points out that a consequence of the foregoing work is the proportionality of mass and energy.

Minkowski's Raum and Zeit (1908) is the fifth article. Here the simple four-dimensional formulation of mechanics and of the inverse square law of attraction is first clearly exhibited—yet not so clearly that Sommerfeld's explanatory notes are unwelcome. This address of Minkowski's had been reprinted separately, and to the exhaustion of the edition is perhaps due the publication of the present collection.

The final article is from Lorentz's Alte und Neue Frage der Physik (1910) and forms an appropriate close to a series which presents concisely and at first hand the steps in the development from the Michelson experiment to the full fledged theory of relativity.

E. B. Wilson

Controlled Natural Selection and Value Marking. By J. C. Nottram. New York, Longmans, Green and Co. 1914. Octavo. Pp. 130.

The author of this book advances a new theory to account for the origin of sexual dimorphism and of polymorphism within animal species. He starts with the assumption that the competition in the struggle for existence is frequently between groups rather than between individuals. Thus, family may compete with family, or pair with pair, rather than individual with individual. Conspicuousness on the part of one member of the family (its least necessary member) it is supposed, may insure persistence of the family by drawing the attacks of enemies to the one and thus diverting them from the more valuable members of the family. Thus male conspicuousness, in sexually dimorphic species, is supposed to be advantageous to the female and young. "Controlled natural selection ac-