good are so intermingled that the uninitiated reader cannot know what is reliable and what is false.

While Wilson's book leaves little to be desired in respect to careful statement, there is one ground for serious regret, namely, the omission of reference to certain important American papers. We may excuse this in a foreigner, but not in an author in Prof. Wilson's position. Thus, Kofoid's papers upon cleavage in Limax are not referred to in the whole book, yet he first called attention to the failure of Balfour's law referred to on page 273. Also his contributions to the laws of spiral cleavage are of the first importance.

A comparison of the press work of the two books reveals as great a difference as the matter. For in the translation of Hertwig the type is small and worn and the numerous half-tone reproductions are frequently muddy—like the translation. On the other hand, the type in Wilson's book is beautifully clear and the figures, which are nearly all new to text-books, are all that could be desired. The work is indeed a model in the beauty of its illustrations.

While it is impossible to summarize such a book as Wilson's, yet a few of its salient features and conclusions on debated questions may be mentioned. Especially noteworthy are the Table showing the number of chromosomes in germ and somatic nuclei of various animals, and the Glossary, which gives the authors and dates of introduction of each term. Although treating fully Bütschli's view of the honeycomb structure of protoplasm, the author believes (page 19) that the fibrillar structure is the more typical. All the organs of cell-division—centrosome, spindle and chromosomes—are to be regarded as differentiations of the primitive nuclear structure (page 67). His conclusions concerning the factors determining development are clearly stated on page 323 as follows: "Development may thus be conceived as a progressive transformation of the egg-substance primarily incited by the nucleus, first manifesting itself by specific changes in the cytoplasm, but sooner or later involving in some measure the nuclear substance itself. * * * Cell-division is an accompaniment, but not a direct cause of differentiation. The cell is no more than a particular area of the germinal substance comprising a certain quantity of cytoplasm and a mass of idioplasm in its nucleus." These quotations may serve to show that the book is written on broad lines. It certainly takes rank at once among the most important biological works of the period, and it is a book of which its publishers and all Americans may well be proud.

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Physiological Papers. By H. NEWELL MARTIN. Dr. Sci., University of London; A. M., University of Cambridge; M. B., London University; M. D. (Hon.), University of Georgia; late Fellow and Lecturer in Christ College, Cambridge; Fellow of University College, London; Fellow of the Royal Society; Professor of Biology, Director of the Biological Laboratory and Editor of the Studies from the Biological Laboratory, Johns Hopkins University, 1876–1894, and Professor of Physiology in the Medical Faculty of the same. Memoirs from the Biological Laboratory of the Johns Hopkins University III. Baltimore, The Johns Hopkins Press. 1895.

The book before us is intended to commemorate the connection of Prof. Newell Martin with the Johns Hopkins University. In it are reprinted his physiological papers published from the Biological Laboratory created by him there, and some of the public addresses delivered by him on various occasions in this country. The whole forms a handsome quarto volume, valuable not only from its commemorative significance, but also as uniting conveniently for study and reference a series of important and interesting contributions to medical and biological science.

From the physiological point of view, especially at the present time when the investigation of the isolated mammalian heart is being actively renewed, most interest attaches to the papers in which Prof. Martin described the evolution of what he himself termed the Baltimore method for the isolation of the mammalian heart, and many of the most important results obtained with it. The mutual influence exercised on one another by the dif-

ferent parts of the mechanism by which the mammalian circulation is carried on, and the functional connection of all of these by means of the nervous system with all the other organs of the body, often render difficult, sometimes impossible, the drawing of reliable conclusions as to the direct effect of any agency on the heart itself from experiments on the whole organism. Here, therefore, was especially a case for the application of the physiological method of isolation: the separation of a given organ from all its functional, if not anatomical, connections; and keeping it alive, in spite of this separation, by the artificial maintenance of the necessary conditions of continued vital activity in the case of warm-blooded animals—a suitable temperature and a sufficient and constant supply of arterial blood. With an organ thus isolated the determination of the *direct* influence upon it of various factors can relatively easily be certainly determined.

The isolation of the mammalian heart, which Carl Ludwig and Alexander Schmidt had found impossible in 1868, was first accomplished by Newell Martin in 1881. In order to secure arterialization of the blood sustaining the nutrition of the heart, the lungs, rhythmical inflation of which was artificially kept up, were left in functional connection with it. The remaining organs of the body, deprived of their normal blood supply soon die, the heart, however, continuing to beat in a perfectly normal manner for so long as five hours and more, although deprived of all influence of the central nervous system. The pressure under which venous blood flows into its right side can be varied by changing the height of the reservoir containing this, as can also be the pressure under which the left ventricle empties itself by alterations in the height of the outlet connected with it.

With the aid of this method, modified in details as circumstances required, various important fundamental questions in the physiology of the mammalian heart were attacked and solved in the Baltimore laboratory. Most of the communications describing the results of these researches are contained in the present volume, Prof. Martin having been author or joint author of them.

Their titles are: 'A New Method of Studying the Mammalian Heart;' 'The Influence upon the Pulse Rate of Variations of Arterial Pressure, of Veinous Pressure, and of Temperature;' 'Observations on the Direct Influence of Variations of Arterial Pressure upon the Rate of Beat of the Mammalian Heart;' 'The Direct Influence of Gradual Variations of Temperature upon the Rate of Beat of the Dog's Heart' (this formed the Croonian Lecture of the Royal Society for 1883); 'The Action of Ethyl Alcohol upon the Dog's Heart;' 'Experiments in Regard to the Supposed Suction Pump Action of the Mammalian Heart,' and 'On the Temperature Limits of the Vitality of the Mammalian Heart.' It is of distinct historical importance that in this last investigation, in which E. C. Applegarth took part, it was found possible to isolate the heart and keep it alive independently of the lungs, the blood being aerated simply by air bubbling through it. The recent work of Langendorff in Rostock on the isolation of the cat's heart without the aid of the lungs was thus essentially anticipated.

The other original investigations described in the volume are mostly concerned with the respiration. They include Martin's elaborate research on of the respiratory movements of the frog and their nervous mechanism, and the study of 'The Influence of Stimulation of the Mid-Brain upon the Respiratory Rhythm of the Mammal,' in which W. D. Booker was collaborator, the results obtained being later confirmed by Christiani in Berlin. Martin's valuable contribution to the question whether the internal intercostal muscles are to be regarded as inspiratory or expiratory in function, his decision being in favor of the latter alternative, is, of course, also given.

Those of Newell Martin's public addresses on more or less general subjects included in this volume well deserved to be so. They are all admirably written and are most stimulating reading. Martin was a strenuous advocate of the justifiability of vivisection, and in several of his addresses made most powerful pleas for it. A passage such as the following is perhaps more worth quoting in America at the present time than when it was first written:

"It is not mere physical suffering that we

labor to diminish. We labor to save *life—human life* with all its ties. Were I to see a man tortured with facial neuralgia, and knew that I could relieve him by inflicting equal pain on a dog or horse, I hardly know what my decision would be. I suppose I should decide in favor of the man. But that is not the question which faces our profession in regard to experiments on animals; it is how we may better our knowledge and increase our power to save the life of husband and father—of wife or mother—of the child in whose life the hearts and hopes of its parents are bound.

"Certain of our opponents have their sympathies greatly excited by the occasional cry of a dog enduring pain from pharmacological experiment. Have they listened to the wail of the new-made widow? Some of them use their fiercest invective to calumniate those who have kept animals alive a few days after an experiment, that the causation of disease may be better understood and its prevention made possible. Have they realized the years of penury and misery too often the lot of the orphan? They have not felt personal responsibility for the life of the bread winner, or they would surely say with us, kill a hundred, kill a thousand animals if you have any reasonable hope of thereby preserving to one wife her husband, to one child its mother." (p. 254.)

Since the greater part of the above was written, the unexpected news of Newell Martin's death has come from England Our consolation for the relatively early loss of so brilliant a physiologist can only be that in the time given to him for scientific work he obeyed his own exhortation at the close of the lecture inaugurating the biological work of the Johns Hopkins University: "Let us, then, each work loyally, earnestly, truthfully, so that when the time comes, as it will come sooner or later, in one way or another, to each of us, to depart hence, we may carry with us a good conscience, and be able to say that in our time no slipshod piece of work ever left the laboratory; that no error we knew of was persisted in; that our only desire was to know the truth. Let us leave a record which, if it perchance contain the history of no great feat in the memory of which our successors will glory, will at least contain not one jot or one tittle of which they can be ashamed."

The isolation of the mammalian heart will always remain one of the triumphs of experimental physiology. F. S. LOCKE.

HARVARD MEDICAL SCHOOL.

Anleitung zur Mikrochemischen Analyse der wichtigsten Organischen Verbindungen. Von H. BEHRENS, Professor an der Polytechnischen Schule zu Delft. Zweites Heft. Leopold Voss, Hamburg und Leipzig. 1896. 106 pp.

The second part of Behrens' text-book of microchemical organic analysis deals with the important fibres: those of woven goods; wool, silk, cotton, linen, hemp, jute and others; and those of paper; the cellular fibres of straw, alfalfa and wood. The microchemical study of these substances with reagents and in polarized light, and methods for examining woven goods and paper, complete the book. It is well printed and illustrated and a complete work in itself. Besides the illustrations in the text, three beautifully colored plates reproduce the appearance of the different fibres in polarized light and when stained with different dyes. It is well to remember that Prof. Behrens is not only an authority on this subject, but is the only authority for the student, as he has written the only text-books. The organic analysis is a worthy continuation of the author's inorganic analysis.

E. R.

SOCIETIES AND ACADEMIES.

CHEMICAL SOCIETY OF WASHINGTON.

THE 91st meeting of the Society was held Thursday evening, December 10, 1896. The President, Dr. de Schweinitz was in the chair, with thirty members and several guests present.

The first paper of the evening was by Prof. H. W. Wiley on 'The Mechanical Analyses of Phosphatic Slags.'

The second paper was by Prof. Charles E. Munroe, entitled 'An Early Specimen of Gun Cotton.' Prof. Munroe called attention to a sample of gun cotton which he had received from Dr. W. A. Hedrick, some two years ago, and which had been for many years