no less than one hundred plates and forty-six text-figures accompany the one hundred and ninety-nine pages which compose the text.

The book is divided into two parts, the first of which treats of the theory, briefly discussing inheritance, variation, the struggle for existence, mutation, artificial selection, sexual selection, segregation, and the inheritance of parental modifications. The second part considers the phenomena explained by the theory, under the headings of comparative anatomy, embryology, paleontology, geographical distribution, and the color of animals, and concludes with a chapter on the evolution of man and some general considerations.

Within the brief limits to which the text is confined a consideration of all the factors which have been proposed or recognized as contributing to organic evolution is impossible. The difficulty before the author of such a book is to decide what to omit, and, on the whole, Professor Metcalf may be said to have grappled successfully with his difficulty. But little extra space, however, would have been required for a presentation of the theory of orthogenesis, and a brief account of the observations of Bumpus on sparrows and Weldon on Carcinus would have given a more definite meaning to the term 'selection-value.' Further, it may be remarked, that in the list of works on evolution given in an appendix no mention is made of Haeckel's 'Evolution of Man,' which surely deserves a place in such a list, even if Plate's admirable treatise be excluded, because as yet un-Englished.

These omissions are, however, but minor faults, if faults they may be called. More deserving of criticism is the title of the book, which is really an exposition of the theory of natural selection. In the popular mind the theories of evolution and natural selection are so intimately associated that recent criticisms of the latter and suggestions of various additional factors of evolution have led, in many cases, to the belief that the doctrine of evolution is tottering on its base and is well-nigh, if not entirely, discredited. Nor is the confusion of the two theories altogether confined to the popular mind, and anything which tends to foster it is to be deprecated. Whether natural selection in the Darwinian sense stands or falls, the doctrine of evolution remains unshaken.

And this is not the only confusion that exists with regard to the theory. It has been discussed both as a factor in the origin of species and as a factor in the preservation of species, or rather of adaptations which may or may not be specific. In its former application it is certainly open to criticism; in the latter, and stated as the theory of the elimination of the unfit, it is almost self-evident.

Professor Metcalf's book, unfortunately, tends to perpetuate these confusions; but even with this fault it is a book worth reading and well deserves its success.

J. P. McM.

*The Microscopy of Vegetable Foods,* with special reference to the detection of adulteration and the diagnosis of mixtures. By Andrew L. Winton, Ph.D., in charge of the Analytical Laboratory of the Connecticut Agricultural Experiment Station, Instructor in Proximate Organic Analysis in the Sheffield Scientific School of Yale University. With the collaboration of Dr. Josef Moeller, Professor of Pharmacology, and Head of the Pharmacological Institute of the University of Graz. With 589 illustrations. New York, John Wiley and Sons; London, Chapman and Hall, Limited.

This work is a very timely one in view of the fact that the pure-food bill will go into effect on January 1, 1907. Owing to the importance of the subject, whether from the point of view of the manufacturer or that of the consumer, it seems rather strange that until now so few good working books have appeared on this subject. While there are several good books by German authors on the subject of the microscopical examination of foods, there is nothing that can compare with the volume at hand.

Both Doctors Winton and Moeller are well known for their valuable researches on the subject of food products. Dr. Winton is a former student of the eminent pharmacognosist, Professor Moeller, and it is rather unique to find a student associated with his

teacher in this way, each contributing his part to a common work, and the whole appearing almost simultaneously in two languages. In the American edition it is Dr. Winton with the collaboration of Professor Moeller, while in the German edition it is Professor Moeller with the collaboration of Dr. Winton. This is a beautiful acknowledgment of their confidence in each other, and we have seldom seen the work of two men that is so much alike in both drawings and descriptions as in this instance.

The work is divided into ten parts, as follows: (1) Equipment, methods and general principles; (2) grain, its products and impurities; (3) oil seeds and oil cakes; (4) legumes; (5) nuts; (6) fruit and fruit products; (7) vegetables; (8) alkaloidal products and their substitutes; (9) spices and condiments; (10) commercial starches. The work contains in addition a general bibliography, a useful glossary and a good index.

A careful examination of this book of Winton and Moeller's shows that in order to carry on analyses of vegetable food products successfully it is essential for the analyst to have special botanical training, and that with the knowledge gained by this training the determination of purity and the detection of adulterants is reduced to a degree of scientific accuracy hardly possible in any other kind of analytical work. The teachers of chemistry and those in the biological departments of colleges and technical schools should cooperate in arranging courses which would not only qualify their students to examine vegetable products, but also enable them to devise methods for their manufacture.

This book could be used as a text-book, and will be found an invaluable reference book for the food analyst, the agricultural chemist, the pharmacist and others engaged in the examination of foods, as well as the physician who may be called upon to identify vegetable substances in stomach contents and feces.

HENRY KRAEMER.

*Essentials of Crystallography.* By EDWARD HENRY KRAUS, Ph.D., Junior Professor of Mineralogy in the University of Michigan. Ann Arbor, Mich. 1906. Pp. 162; 427 figures.

Unlike some related sciences crystallography is not over-burdened with texts, certainly not with those printed in the English language. The appearance, therefore, of a new crystallography is an event of considerable importance to teachers of mineralogy. The author of 'Essentials of Crystallography' was trained in the laboratory of Professor Paul v. Groth, of Munich, and in the two brief years that he has been in the faculty of the University of Michigan, has developed a flourishing department which already requires the services of a professor, an instructor and two assistants.

Most writers of books upon crystallography appear to go out from the idea that the subject is adapted to study by a very limited number of persons, and those only who are to become thorough masters of the subject and advance it through original research upon general lines. Thus the texts published in England have laid stress upon mathematical theorems rather than upon the symmetry of crystals. The great development of organic chemistry in recent years, and the prominence which crystal symmetry and habit have acquired as means for identifying chemical compounds, has demonstrated that crystallography is a necessary part of the training of chemists as well as of mineralogists and geologists. For such students much must be eliminated from consideration in order that essential facts may be grasped, and the course be given a practical value.

The requirements of such students were singularly well met by the 'Elements of Crystallography' of the late George Huntington Williams, as was, perhaps, shown by the rather extensive use of the book by American teachers. Since the profound changes brought about by the acceptance and introduction of Gadolin's thirty-two classes of crystals, Williams's work has been no longer serviceable as a text, and its place has not been filled by any later work.

Professor Kraus apparently makes the fundamental assumption that crystallography can not be learned outside of a crystallographical laboratory or without the guidance of a