series. Their frequency suggests the average vertical extent of these cells in series to be five cells.

The cells in question are not to be confused with the long and narrow vessel elements of some woods nor with those vessel members which bear flap-like prolongations extending far beyond the perforation plate. Except for their perforations these cells differ not at all from the typical imperforate fiber-tracheids all about them. Since the xylem is well supplied with huge vessels it is improbable that these short series of perforated cells whose lumens are only as wide as the walls are thick would aid water transport materially.

Subsequent examination has shown similar cells to exist in all other species in our collections of the genus *Passiflora*, as follows: *P. menispermifolia* H.B.K., *P. seemanni* Griseb., *P. biflora* Lam., *P. misera* H.B.K., *P. punctata* H.B.K., *P. auriculata* H.B.K. and *P. coriacea* Juss.

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A POSSIBLE RELATION OF VITAMIN E TO UNRESTRICTED CELL DIVISION

As a result of a long series of experiments which have been carried out by the writer in collaboration with Drs. Card and Sloan, of the department of poultry husbandry of the University of Illinois, a large mass of evidence has been obtained which goes to show that vitamin E is very intimately associated with, and probably exerts an indirect controlling influence over, the nucleus of the cell during cell division.

In earlier experiments on the effects of vitamin E deficiency on the developing chick embryo, using a modification of the Waddell-Steenbock method of destruction of this vitamin by treating food with ferric chloride, remarkable conditions of tissue proliferation were encountered. It was also found that somewhat similar effects could be established in older birds under these conditions.

With this clue as a basis for further work, prolonged feeding of the treated food to chicks has resulted in the development of characteristic pathological lesions affecting the visceral organs. Histologically, these are found to represent foci of degeneration and destruction of normal tissues accompanied by replacement and invasion by new cell growths, which, in turn, appear to be derived from an undifferentiated type of tissue having the form of a delicate reticular syncytium. The whole series of effects are apparently due to a phenomenon of uncontrolled and unrestricted cell growth simulating malignancy.

A complete account of the results of this work and a possible theoretical explanation of the relation of vitamin E to unrestricted tissue growth, which will serve as a working hypothesis, will be presented in a separate article in the near future.

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SEPT. 19, 1934

THE CHEMICAL TRANSMISSION OF NERVE IMPULSES

MY address at Indianapolis on "Chemical Ideas in Medicine and Biology" (SCIENCE, Vol. 80, p. 343) was published so promptly that I had no opportunity of correcting a rather serious error in my statement dealing with recent work on the chemical transmission of nerve impulses. I stated (p. 347) that the weight of acetylcholine required to transmit the effect of a single nerve impulse to a single ganglion cell was of the order of 10^{-21} gram; and, as Mr. Watson Davis reports under "Science News" in the same number, I verbally emphasized this estimate before a great and distinguished audience by stating that it represented about 3 molecules of the substance. Dr. Langmuir had, in fact, had the kindly interest to make this last calculation for me just before the meeting. Not till my arrival in London did I make the humiliating discovery that the distractions of a brilliant occasion had led me into the promulgation of a gross numerical error. An important factor of 10^6 had slipped out of the calculation. The figure should have been 10^{-15} in place of 10^{-21}, and from this correct value the calculated number of molecules would have been three million, not three. The incorrect statement, as I made it, may cause some theoretical pangs to physiologists who read it, and I wish to relieve their bewilderment as promptly as possible.

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LONDON

SCIENTIFIC BOOKS

PARASITISM AND DISEASE

Parasitism and Disease. By THEOBALD SMITH. 196 pp. Princeton: Princeton University Press. $2.00.

FORMER students of Theobald Smith and medical men in general will welcome his book on "Parasitism and Disease." This work, based on his Vanuxen lectures, but expanded and with additional chapters, is presented as his "final attempt at showing the relation between disease and parasitism in its broadest manifestations." Read critically, some of the material

here presented as factual may not be generally accepted as such, but since the work is intended for a mixed audience and because of the vastness of the information drawn from various fields, a certain number of inaccuracies are to be expected. In fact, the author states "even the actual truth must now and then be strained to simplify presentation."

The concept of conflict of host and parasite as an interpretation of disease is quite acceptable and in fact is firmly established in the consciousness of medical men, but perhaps too much emphasis is given to this concept when it is applied to the entire organic world, for the relation of many organisms involve no more than competition, while beneficial cooperation is also a wide-spread phenomenon. Indeed to many biologists, the wide occurrence of mutualism and well-balanced relations may be quite as impressive.

In the chapter on "The Stage of Conflict between Host and Parasite," Smith is at his best, having wide acquaintance and extensive experience in the field covered. His review of the results of investigations in the field of immunology is most illuminating. There is that unusual capacity of surveying a great amount of material from a detached point of view rather than a rehearsal of intricate detail. Simplicity of presentation gives the reader a ready grasp of the subject. Among the many charms of this work as a whole is the avoidance of hypotheses explaining all results. On the contrary, there is a fair statement of contradictory evidence and a free discussion of many questions as yet unanswered. The chapter on epidemiology furnishes a brief but interesting review of major epidemics and a discussion of factors that play a part in such.

In the opening statements of the last chapter on the utilization of discoveries, it would appear that the author has overstressed the importance of the utilitarian objectives in research. While it is true that the outstanding figures of the last half century in the medical sciences have attacked practical problems, surely this tendency at the present time needs no encouragement. Important contributions by the older zoologists and parasitologists, such as the discovery of intricate life histories, are all but forgotten in modern medicine, but they have doubtless furnished a basis for our views on the relation of parasitism to disease. It need only be pointed out that we do not look to actuaries for outstanding creative work in mathematical problems, nor have generations of horticulturalists engaged in the improvement of the garden pea produced a Gregor Mendel.

Irrespective of whether one agrees with Dr. Smith on all points, this book will be found both stimulating and instructive. Open-mindedness is a quality sufficiently uncommon to be appreciated when encountered. The book will doubtless prove of great value to biologists and zoologists as well as to those interested in the medical sciences.

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CRYSTAL STRUCTURE

A Study of Crystal Structure and its Applications. By WHEELER P. DAVEY. McGraw-Hill Book Co. 695 pages + xi. 1934.

THIS large book is intended for use as a text-book in graduate courses on the structure of crystals. In the opinion of the reviewer the book can not be considered as satisfactory for this purpose.

The subject of the structure of crystals and methods of structure determination is characterized by its inclusion of portions of several branches of knowledge with which the student of chemistry and physics is usually not familiar, such as the theory of space groups, the special geometric apparatus of the crystallographer (including extensions developed for crystal-structure applications), etc. Moreover, any one of the various procedures used in determining the structure of crystals involves a number of steps, some of which depend on logical arguments not often met in other fields of research. There is great danger that a student will become confused, and it is especially desirable that a text-book dealing with this subject be written clearly and logically and be free from errors. It is accordingly regrettable that in the book under review many of the discussions and derivations are needlessly long and complicated and marred by serious as well as minor errors. As an illustration, one chapter will be described.

The detailed discussion of the determination of the structure of representative crystals is an especially important part of a crystal-structure course. In Chapter IX, dealing with this subject, the author treats sodium chloride, calcite and tricalcium aluminate. In the treatment of sodium chloride, the unit of structure is taken as containing four molecules without discussion of the possibility of its being larger or of the evidence that should be collected against this possibility. The very important argument involving determination of the Bravais lattice is not used.

In finding the unit of structure of a crystal with the point-group symmetry of calcite, it is necessary first to find the smallest hexagonal unit which will account for all observed x-ray reflections, and then to apply the rhombohedral criterion to see whether the underlying lattice is hexagonal or rhombohedral.