are giving atmospherics close attention, even though the problems do seem too difficult for them to handle, either in printed memoirs or in lectures before their classes. I beg to utilize the columns of SCIENCE in an effort to ascertain the existence of such scholars and to solicit their cooperation with me in an endeavor to stimulate the study of the motions of the atmosphere.

The U. S. daily weather map of the northern hemisphere and *The Monthly Weather Review* will undoubtedly be useful to all earnest students.

CLEVELAND ABBE

SCIENTIFIC BOOKS

The Fungi which Cause Plant Disease. By F. L. STEVENS, Ph.D. New York, The Macmilan Co. 1913. Pp. 754. Figs. 449. Price $4.00.

Eighteen years ago the classic work on "Pilzpärasitaren Krankheiten der Pflanzen," by Frank, made its appearance, while the "Diseases of Plants Induced by Cryptogamic Parasites," by von Tubeuf and Smith, was published a year later. Despite the fact that a number of efforts have been made within the last few years by American writers, pathologists in general have been still looking for a new work that would satisfactorily supplant these older volumes. Stevens has entered the field with another volume which is intended to supplement his earlier and less technical work on "Diseases of Economic Plants." In the words of the author, "effort has been made to avoid duplication of matter contained in that volume." It is to be regretted that but little of the mycological and pathological activities of the past three years will be found in this new work (1911 in part only). This is to be deplored, since plant pathology has been passing through a period of rapid progress. It will perhaps be only fair, however, to overlook this shortcoming in passing judgment on the work in question. To what extent these two volumes will meet the expectations and needs of American students time alone will reveal. Perhaps we are expecting too much, but our mind has pictured the old classics as but stepping stones to the desired goal.

This new volume includes keys to the orders, families and genera of Myxomycetes, Schizomycetes and Eumycetes containing parasitic species. According to the author's statement, "Nonparasitic groups closely related to those that are parasitic have been introduced in the keys merely to give a larger perspective to the student." Directing our attention to the Ascomycetes, we may note that the keys are in the main translations from "Die natürlichen Pflanzenfamilien," with omissions and abbreviations, and occasionally the introduction of new genera. Parallel choices are indicated by marginal indentation, the characters employed in the original being omitted. Turning to the Fungi Imperfecti, we find that after the key to the hyaline-spored Sphæroidaceæ which follows Engler and Prantl quite closely, the keys appear for the most part to be transcriptions from Clements's "Genera of Fungi" with only slight modifications. The student who can steer his way through the key to the hyaline-spored Sphæroidaceæ without becoming lost in a bewildering tangle of spores, pycnidia and stromata, would deserve early election to Sigma Xi.

It is not possible to enter into a detailed discussion of the keys, but it seems that the author has relied too much on keys published some years ago, so that they are not always in harmony with our present knowledge. For example, "Conidia not in pycnidia, dark brown" is used as the key character for *Melanconis* (p. 279), although it is now known that certain species produce pycnidal (*Fusicoccum*) and acervular (*Coryneum*) stages.

According to the keys the vegetative body of the Schizomycetes is a "single-walled cell" (p. 3); *Nœmospora* is placed under the division with muticate conidia (p. 538), probably correctly, but the text description says "with a bristle at each end." This genus is given under both the Hyalosporæ and the Scolecosporæ (pp. 538 and 562).

The experienced mycologist makes little use of keys, but when he does care to use them he will certainly go to the original. The prin-

cipal advantage of the present volume is that it does make the keys available for students who have no knowledge of German or Latin, but such students are out of place in mycology or pathology.

Speaking of the work as a whole one is impressed with the number of its typographical errors. It is not difficult to find pages with three to four each, and their character leads one to suspect that they are not entirely printer's errors. Many are more striking than the use of a wrong letter in a word. The following serve to illustrate the type: *host* for bast; *perithetical* for perithecial; *epithelium* for epithecium (see also author abbreviations).

There is an apparent tendency to exclude from consideration the species of fungi parasitic only on wild hosts of no economic importance, although this practise has not been rigidly followed. In genera containing many species these appear to be presented in kaleidoscopic succession—if there is any logical arrangement either alphabetical, host, phylogenetic or according to importance we have not been able to detect it. The descriptions are especially full in those groups which have been monographed somewhat recently.

Attention will be directed to a few of the remarkable statements which have attracted the writer's attention. "Tubeuf ranks as *hemi-parasites* those organisms that usually are parasites, but may sometimes become saprophytic, and as hemi-saprophytes such as are usually parasitic, but may exceptionally become saprophytic." It is fortunate that this definition is followed by the statement that "these distinctions are of little import" (p. 2). Teachers of botany will probably be impressed by the rarity with which *hypha* is used in the text, and the apparent application of the term to spore-bearing branches only (pp. 60 and 477). The statement that "the oogonium becomes free just before conjugation" (p. 74) gives a mixture of isogamy and heterogamy in the terms employed, while the information that "sexual spores (zygotes) are produced through the union of the two like gametangia" (p. 102) could have been presented in less objectionable form. The description of *Sclerotinia trifoliorum* Erik, is followed by the strange statement: "Unknown on clover" (p. 143).

In the face of the general consensus of opinion in America that the chestnut blight fungus belongs to *Endothia,* it seems strange that the author accepts Rehm's classification. According to the description of the blight fungus the perithecia are "deeply embedded in the inner bark," the summer spores are "pale yellowish," and "the perithecia appear in abundance upon or in cracks in the bark, extruding their spores in greenish to yellow threads" (p. 208). This is indeed quite a contrast to the true condition: perithecial stromata erumpent from beneath the periderm, ascospores forcibly expelled, and pycnospores hyaline.

The student's conception of the morphology of the promycelium will be a little mixed when he reads: "In every species the mycelium eventually gives rise to teliospores, which produce in germination four basidia, either remaining within the spore-cell or borne in the air on a short promycelium, each basidium supporting a single-stalked or sessile basidiospore" (p. 324). "Morphologically the promycelium is a basidium bearing its four sterigmata and four basidiospores" (p. 326). In various species of rusts the "peridia are scattered over the whole of the foliage" (p. 356) or "in elongated patches" (p. 376).

One may read that the hymenium of *Hydnum* is "beset with pointed spines" (p. 414); that the young hyphæ of *Fomes fraxinophilus* "are very fine and require an immersion lens for observation" (p. 434); also of the "Oospora forms of the Erysiphales" (p. 474).

The statement that *"Phleospora moricola* (Pass.) Sacc. on Morus is a conidial form of *Septogloeum mori,"* another imperfect fungus, is hardly in accord with mycological practise.

Considering the chaotic condition of mycology, it is not surprising that some species are duplicated or listed under the wrong genera. We may note, for example, that *Septoria cerasina* Pk. (p. 520) is described without any

intimation that it is synonymous with *Cylindrosporium padi* Karst. (p. 562). *Phyllostica hortorum* Speg. is given with no reference to the European work which showed that this egg plant fungus is an Ascochyta (p. 487). *Strumella sacchari* Cke. is listed as the only representative of the genus (p. 656), although it has been definitely shown that this fungus should be referred to *Coniothyrium*.

The author has very consistently followed the practise of decapitalization of specific names throughout the text, and for this he should be commended, although the rules of nomenclature dictate otherwise. It is difficult, however, to understand why species names became sufficiently important in the index to be uniformly capitalized! The very general botanical practise of italicizing binomials has been completely ignored, and will probably meet with little approval. The misspelling of scientific names is altogether too frequent. These are well illustrated by "*Pithiacystis citriophora*" (p. 77) and "*D. wilkomii*" (p. 144).

It is to be hoped that the accuracy of the author citations for the binomials is not indicated by the entire lack of any regular and consistent practise in their transcription and arrangement. Without regard to the length of the author's name, it is abbreviated (Sh. = Shear) or written out in full (Müller-Thurgau, p. 148). The same author's name may be written in full or abbreviated in a variety of ways, and in many cases these abbreviations are not in accord with mycological practise (*e. g.*, D. By., DeB. = De Bary; E. & H., E. & He., Er. & Hu., = Eriksson and Henning.) There are numerous cases of full names terminated by a period, indicating an abbreviation, and dozens of abbreviations without a period, indicating the full name of an author. Thus the amateur reader might wonder who Prill, West, Hohn, March, Plow, Rost, Berk, Karst, Heuff and others were, while for Frank., Brizi. and Petch., he might imagine the existence of such mycologists as Frankenstein, Brizioski and Petchnikoff. There are many errors in the spelling of author abbreviations, and in some cases they bear little resemblance to the original (*e. g.*, Farm. = Farneti; Hu. or Hem. = Henning; Fes. = Fries; Car. = Carvara; Gus. = Güssow; Ren. = Reinke; Heuff. = Heufler; Nebr. = Neuman.)

The profusion of illustrations (Figs. 1–449) certainly adds greatly to the value of the book. They are drawn quite extensively from American authors and are in the main well chosen. But in the Fungi Imperfecti many of the figures taken from Lindau's treatment in "Die natürlichen Pflanzenfamilien" appear rather crude. The author's effort to include "at least one illustration of each genus that is of importance in the United States" is a very commendable feature.

The illustrations are reproduced with the original figures or letters used in their explanation, even though in some cases (Fig. 288) they may be almost microscopic in size. The presence of numbers and varieties of figures and letters not used in the legends (*e. g.*, Figs. 9, 82, 88, 275, 413, etc.) may not be of any harm but they give a scrap-book appearance. The explanations of figures are in many cases too short (Figs. 13, 20, 129, 145, etc.) or incomplete (Fig. 351). There is no uniform style of punctuation in the legends, great variety prevailing (*e. g.*, Figs. 179, 198, 200, 421). Apparently the author has not been able to entirely discard the old practise of calling a pycnidium a perithecium (Fig. 354, also p. 493).

It would seem a little questionable to use a figure of a germinating teleutospore of *Gymnosporangium* (Fig. 266) showing two promycelia from a single cell in a work which should present the typical rather than the abnormal.

Following the customary practise, the illustrations are credited to various writers. If the student should assume the authenticity of the acknowledgments, as he naturally would, he would get some wrong ideas of the photographic activity of at least one author. Fifteen half-tones of basidiomycetes are presumably "after Clements." Five of these can be found in Freeman's "Minnesota Plant Diseases" as "Originals," one is from Lloyd,

one from Hard and four are from Atkinson's "Mushrooms."

According to the preface, "abundant citations to the more important papers are given, sufficient, it is believed, to put the student in touch with the literature of the subject." These are distributed through the book as five separate bibliographies, one for each of the principal divisions or classes, with a list of "some of the most useful books," at the end of the volume. It is difficult to detect any principle that has been followed in the selection of references, since some very unimportant work is cited while the student is left in the dark concerning the sources of information for some more important fungi.

The citations in the five general bibliographies are in neither alphabetical arrangement nor chronological order, but are listed in part in the order in which they are used. The climax is reached in the list of "some of the most useful books," 1–29 being arranged alphabetically by authors, while 30–64 are apparently not arranged at all. From 1–46, the author's initials, when used at all, stand first, while from 47 to the end the reverse order is followed.

Referring to all the bibliographies, it can be very emphatically stated that clearness is sacrificed for brevity. There is much waste space on each page that might have been utilized to good advantage. At the beginning of the first bibliography a key is given to the abbreviations used for the U. S. Department of Agriculture and Experimental Station publications, and a few of the more common serials, and this is followed by a statement that "other abbreviations are those usually employed or readily understood." This can hardly be true unless the book is used by students gifted with more than ordinary insight. It is extremely doubtful if such citations as the following would be clear to the average student: "O. E. S. B. 33: 308. 1896; Mo. Fruit B. 17: 1910; B. S. M. d.Fr 8: 22, 1892; Agr. Soc. 8: 292, 1894; N. S. R. Wales, 93; Unt. 9; F. B. 238: 14, 1907; Rept. Mic. Vio., N. S. Wales, 1909; Zeit. f. L. u. F. 408, 1910; Ruhland, Diss. 1903." The bibliographies contain numerous errors, typographical or otherwise, and there is at least one "Miss. Kew" (p. 111). The omission of the initials of authors in many cases is a confusing feature, and the errors of punctuation give some rather odd combinations (*e. g.*, Farlow, W. G. B. Bussey, Inst., 415, 1876; Detmers, O., B4; 1891). When a personal knowledge of an author is necessary in order that one may correctly interpret a citation, the beginner is certainly subjected to an unnecessary and an unjust handicap.

In the literature citations the author in many cases does not even follow his own key. For example, C. Bak. is given as the abbreviation for the Centralbl. f. Bakt. etc., II Abth., but this publication is listed also in four other ways. In the various bibliographies thirteen different combinations of abbreviations are used for the Berichte d. Deutsch. Bot. Gesellschaft, but first place must be assigned to the Bulletin Trimestriel de la Société Mycologique de France with nineteen combinations ranging from the simple to the complex.

The incompleteness of many of the references leads one to fear that many may be second-hand, and that they were never verified. The defects pointed out greatly impair the usefulness of the bibliographies.

A glossary of mycological terms precedes the index. The value of such a feature can not be disputed, but in this case clearness has again been sacrificed to brevity and there are too many instances in which only half the truth has been told (*e. g.*, stroma). Some adjectives are defined like nouns (*e. g.*, autœcious, cytolitic), while a noun may be defined as an adjective (*e. g.*, endophyte). The amateur who relies on this glossary will expect to find catenulate spores "linked as in a chain." or may be looking under leaves for parasites that are designated as hypophyllous.

The use of a single index, rather than separate host and parasite indices is a commendable feature.

In conclusion the writer must express his surprise that any firm with the reputation of the publishers would permit a book containing so many errors to pass through their

hands. They certainly owe to the author and American pathologists a speedy revision.

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A New Era in Chemistry. By Harry C. Jones. New York, D. Van Nostrand and Company. 1913. Price $2.00.

It is expected of a book written by a teacher and investigator so eminent as Professor Jones that it will be written in a clear, enthusiastic and readable style, and especially that it will be scientifically accurate and sound. That the book meets some of these expectations no one can doubt who reads Professor Howe's very laudatory review in the December number of the *American Chemical Journal.* The present reviewer, however, while recognizing merit in the book, certainly believes that no author should be permitted to go uncriticized who is so careless of his statements as is the author of "A New Era in Chemistry."

Among many other passages in the book which are open to criticism the following have been selected as representative.

In discussing the formula for benzene on page 12 the author says: "The study of the substitution products led to the conclusion that three carbon atoms in benzene are different from the other three. . . ." Whatever may be the final outcome of recent work in this field, it is certainly well known that the study of benzene and its substitution products led neither Kekulé nor any of his contemporaries to any such conclusion.

On pages 51–52 is given an inadequate, even quite erroneous, account of the stereochemistry of tartaric acid. The author writes, "Tartaric acid is especially interesting, having the constitution. . . . We see that it contains not only one asymmetric carbon atom, but two. These would have the opposite effects upon a beam of polarized light; the one half of the molecule turning it in one direction, and the other half turning it by an exactly equal amount in the opposite direction. The result would be that the substance would be racemic or optically inactive." Certainly no one can get any clear conception of the stereochemistry of tartaric acid from such a description.

Speaking, on page 63, of the one degree of freedom in the two-phase-one-component system, water and water vapor, the statement is made that "we can vary either the temperature or pressure, but varying the one we fix the other." And on the next page, in discussing the triple point, the author writes: "We can not move the point T in any direction without destroying the equilibrium. . . ."

These are very careless statements, both telling what does not take place. What the author intends to say with respect to the former is that a change either of the temperature or the pressure brings about a concomitant change in the other. With respect to the latter it may be noted that T, the triple point, is a fixed point and therefore can not be moved. A change of temperature or pressure brings about the disappearance of one of the three phases, but does not move the point T.

On page 281 we read, "It [radium] is everywhere, also, in atmospheric air"; and on page 273 it is stated that the alpha particle "carries one positive charge of electricity." Radium apparently does occur nearly everywhere, but its presence in the atmosphere is yet to be demonstrated. The alpha particle carries two charges, not one.

The following, taken from pages 273, 277 and 287, are given as examples of careless statements. No objections are raised concerning what the author probably intended to say: "Radium is naturally radioactive as it is called." "A radioactive substance is one that gives off radiations. . . ." "The best method used was the ice calorimeter." "A gram of radium therefore liberates about eighty calories of heat every hour, during its whole life history." "The largest amount of radium emanation thus far obtained is only a fraction of a cubic millimeter; and, yet, this gives off three fourths of all the heat liberated by radium." A gram of radium liberates heat at the rate of "about" eighty calories per hour so long only as it remains sensibly a