other hypotheses, but positively by shaping men's views regarding disease in a right direction; but the great applications of this view came only when it was demonstrated that certain definitely recognizable microbes were the cause of definitely recognizable diseases. It was the precise, not mere general, knowledge that most largely influenced practice. In the same way regarding fatigue our most valuable applications can be expected to appear only when detailed and precise investigations have reached a high degree of development.

Not all fatigue is dangerous or abnormal, and because children or scholars become tired it does not follow that they are overworked. The lowest functions, notably the heart beat, seem to have an automatic or semi-automatic form of recuperation; so that, provided there is no forcing of them to work at too high a speed, recuperation keeps pace with exhaustion. The highest functions, and, most of all, the brain energies demanded by civilized life, fatigue most readily. At what point normal fatigue passes into abnormal it is not easy to determine. The best test is the capacity for recuperation. A fatigue, however severe, whether physical or mental, that is totally dissipated by a night's rest can hardly be said to be abnormal. It is only when the principal is being drawn upon that the danger of exhaustion begins. Severe effort, periods of strain and stress, are unavoidable in modern life. The capacity to undergo them is a legitimate aim of education, but still more important is the recognition of the danger line and the strength to refrain. A most important phase of intellectual hygiene is that suggested by the dangers of abnormal fatigue. This is only slightly touched upon in the present volume and still awaits a comprehensive as well as practical treatment.

'La fatigue intellectuelle' must be welcomed as a useful and ably prepared compendium; it is by no means a perfect book, possibly not even as good a book as the imperfect material at command made possible. There are some important omissions, such as the neglect of the important work of Lombard and Hodge; the perspective is frequently unfortunate, many pages being allotted to technical discussions which more properly belonged to an appendix, and the main line of argument consequently suffering in continuity; and considerable material is introduced, such as the long discussion of the report on 'le surmenage intellectuel' of the French Academy of Medecine, which is of a secondary interest and hardly germane to the rest of the work. None the less, the volume is a noteworthy one, which no student of psychology can afford to overlook.

It is further noteworthy as the first volume of a series on pedagogy and psychology. The announcement of such a series indicates that in France the problem of the relation between these two disciplines has been seriously taken up. The authors of the present volume are most forcible in their expression of the view that the pedagogy of the future must be founded upon psychology, and that most of the old pedagogy is 'verbiage.' The further progress of this movement in France will be watched with the greatest interest by those in America who are laboring with the same problem.

Joseph Jastrow.

Syllabus der Pflanzenfamilien. Eine Uebersicht über das gesammte Pflanzensystem mit Berücksichtigung der Medicinal- und Nutzpflanzen. Zweite, umgearbeitete Ausgabe. Von Dr. Adolph Engler. Berlin, Gebrüder Borntraeger. 1898. 8vo. Pp. 214.

The near completion of *Die natürlichen Pflanzenfamilien* originated by Engler and Prantl some ten years ago gives this *Syllabus* a peculiar interest, as it attempts to place in compact form the conclusions of the senior and only surviving author of the *Pflanzenfamilien* with reference to the relationships of the various groups of plants. We can but feel that if the cryptogamic projector had lived, the *Uebersicht* would have been less one-sided, for on its cryptogamic side it shows patch-work instead of a logical summary made from a broad perception of relations and perspective. We shall criticize the work mainly from the cryptogamic side, but, as it represents the highest generalization of the so-called Berlin school of botanists, it must also be criticized in those points in which it departs from their announced principles of taxonomy. For the arrangement of the spermaphytes it represents, without doubt, the work

of the highest authority, based as it is on the earlier work of Eichler, for in the past few years the Germans have surpassed the English in their broad philosophical views of taxonomy and are leaving all other European nations far in the rear in their advance in systematic botany. The work is further useful to students in that it calls attention in a brief but pointed manner to those plants which are useful to man, and this with its systematic arrangement makes the syllabus a practical and convenient handbook. In the systematic arrangement the following succession of groups is adopted:

ABTEILUNG,
UNTERABTEILUNG,
KLASSE,
UNTERKLASSE,
REIHE,
UNTERREIHE,
FAMILIE,

A series practically the same as that generally followed on this side of the Atlantic since *Abteilung* is the equivalent of *Phylum*, and *Reihe* of our *Order*.

The chief divisions of plants as far as classes given in the *Syllabus* are as follows:

I. Abteilung. **Myxothallophyta.**
  1. Klasse. ACRASIEAE.
  2. Klasse. PLASMODIOPHORALES.
  3. Klasse. MYXOGASTERES.

II. Abteilung. **Euthallophyta.**
  1. Unterabteilung. *Schizophyta.*
    1. Klasse. SCHIZOMYCETES.
    2. Klasse. SCHIZOPHYCEÆ.
  2. Unterabteilung. *Flagellatæ.*
    1. Klasse. ACHROMATOFLAGELLATÆ.
    2. Klasse. CHLOROFLAGELLATÆ.
    3. Klasse. PHÆOFLAGELLATÆ.
  3. Unterabteilung. *Euphyceæ.*
    1. Klasse. PERIDINIALES.
    2. Klasse. BACILLARIALES.
    3. Klasse. CONJUGATÆ.
    4. Klasse. CHLOROPHYCEÆ.
    5. Klasse. CHARALES.
    6. Klasse. PHÆOPHYCEÆ.
    7. Klasse. DICTYOTALES.
    8. Klasse. RHODOPHYCEÆ.
  4. Unterabteilungen. *Eumycetes.*
    1. Klasse. PHYCOMYCETES.
    2. Klasse. BASIDIOMYCETES.
    3. Klasse. ASCOMYCETES.
    Anhang FUNGI IMPERFECTI [sic].
    Nebenklasse LICHENES.
    4. Klasse. LABOULBENIOMYCETES.

III. Abteilung. **Embryophyta zoidiogama.**
  1. Unterabteilung. *Bryophyta.*
    1. Klasse. HEPATICÆ.
    2. Klasse. MUSCI.
  2. Unterabteilung. *Pteridophyta.*
    1. Klasse. FILICALES.
    2. Klasse. SPHENOPHYLLALES.
    3. Klasse. EQUISETALES.
    4. Klasse. LYCOPODIALES.

IV. Abteilung. **Embryophyta Siphonogama.**
  1. Unterabteilung. *Gymnospermæ.*
    1. Klasse. CYCADALES.
    2. Klasse. BENNETTITALES.
    3. Klasse. CORDAITALES.
    4. Klasse. GINKGOALES.
    5. Klasse. CONIFERÆ.
    6. Klasse. GNETALES.
  2. Unterabteilung. *Angiospermæ.*
    1. Klasse. MONOCOTYLEDONÆ.
    2. Klasse. DICOTYLEDONEÆ.

The most patent objection to the primary divisions of the above series is seen in its clumsy group names. With such appropriate names as *Archegoniata* and *Spermaphyta** in common use on both continents, the use of such compound terms as 'Embryophyta zoidiogama' and Embryophyta siphonogama' is entirely uncalled-for, especially since the supposed characters involved in the terms have been exploded by the researches of Japanese and American botanists. Likewise the use of prefixes, particularly that of 'Eu' is highly objectionable. If a plant is a thallophyte at all, it is naturally a true or sure-enough thallophyte without the use of a prefix; and if the Mycetozoa are to be retained in the vegetable kingdom where they undoubtedly belong, some group name suggestive of their animal affinities would be at once more suggestive as well as more simple than 'Myxothallophyta.'

Notwithstanding the dictum issued from Berlin in regard to the proper rules of nomenclature to be followed, announcing, among a few other excellent suggestions, that family names

*Or *Spermatophyta* if exact etymology rather than condensed simplicity is sought.

exclusively should end in *-aceæ* and ordinal names in *-ales*, in this first publication issued under those rules their author violates them in giving the termination *-ales* to fourteen out of thirty-four of his *classes!* But this is not all. In the synopsis before us the same termination, which by the rules should be restricted to *orders*, is given to group names of four different grades, as follows:

Klassen: Plasmodiophorales, Peridiniales, etc., as above.

Unterklassen: Bangiales, Sphagnales, Andreæales, Archidiales, Bryales.

'*Familien-gruppe* (*Unterordnung*):' Uredinaceales, Auriculariaceales, Perisporiaceales, etc.

Reihen: Is used in the majority of cases (though for less than 60 per cent. of the cryptogamic orders), but with such unnecessary exceptions as Siphoneæ, Phæosporeæ, Zygomycetes, Autobasidiomycetes, Basidiolichenes, Cleistocarpæ, etc., among the cryptogams, to say nothing of *nine out of the eleven* orders of Monocotyledinæ! Surely consistency is not a marked feature of the Berlin system!

If any of the leading parts of a system are to appear, their appearance should be a constant feature. Surely classes and orders should not be omitted in any well-constructed system; and yet here we find no orders whatever among the schizophyta, the diatoms, the conjugatæ, and the gymnosperms, and among many of the cryptogams, particularly the fungi, the orders appear to have been distributed to the next lower groups of some suggested system, instead of being built up as names for closely allied groups of families bound together by such morphological characters as would indicate a community of descent. Surely such conglomerates as *Autobasidiomycetes* and *Euascales* are not homogeneous, and no one familiar with fungi would think of regarding them as such.

If the Zygomycetes and the Oomycetes are to be regarded as simply orders, why should their homologues in the algal series be placed the one as a class (*Conjugatæ*), and the other simply as an order (*Siphoneæ*)? And what reason except inconsistency for not writing the latter name *Siphonales*, uniform with Protococcales and Confervales, which are consistently formed? For our own part we cannot see why *Spirogyræ* and the desmids deserve class distinctions from *Vaucheria*, when *Hydrodictyon* and *Draparnaldia* do not receive it. Surely an order *Conjugales* among the Chlorophyceæ would be a more logical arrangement and it would seem that *Coleochæte* might be more properly advanced to ordinal rank than *Chara* to that of a distinct class. The elevation of the Laboulbeniaceæ to class rank will be regarded as a bold step. Surely with all their unique characters they are more truly Ascomycetes than the Ustilaginales are Basidiomycetes! An order surely they are, as we have before affirmed, but scarcely a class. And one order, the Myxobacteriales, is not even mentioned, due largely, no doubt, to the fact that they have been worked out by an American investigator, for work done on this side of the Atlantic is systematically overlooked by the Germans in their usual self-complacent manner.

We doubt, too, if bryologists will agree in assigning subclass distinction to the four orders of Musci, especially when *Anthoceros* has only ordinal separation from the other Hepaticæ. Neither will fern students agree with the separation of *Marattia* and *Ophioglossum* as types of orders while the other groups of ferns remain merely families. Better by far regard the Filicales, Lycopodiales and Equisetales as orders and thus avoid the unjust and unequal separation of groups that were never thus organized by nature. A similar criticism again might be given to the classes of Gymnospermæ which, posing as orders, would be at once more simple and more rational.

The German tendency towards redundancy shows itself not only in the *Abteilung* as noted above, but also in the *Reihe* as 'Filicales leptosporangiatæ,' and 'Lycopodiales eligulatæ,' and even in the families as 'Jungermanniaceæ anacrogynæ.' Such complexities of polysyllables as well as such minor redundancies as *Euequisetales* should not be allowed to complicate a proper system.

In several cases, ordinal terminations are badly formed as Uredinaceales for the simpler Uredinales, Auriculariaceales for Auriculariales, Hypocreaceales for Hypocreales, Sphæriaceales for Sphæriales, etc., all of which were

more properly used in *Die natürlichen Pflanzenfamilien*, but here have become unnecessarily complicated.

Die natürlichen Pflanzenfamilien has been exceedingly unfortunate in the preparation of its cryptogamic portions, not only in the loss of its cryptogamic editor, but, before the completion of their work, of a collaborator in each of the series algæ and fungi, who were removed by untimely death. This has made the treatment of these groups very unsatisfactory, particularly the fungi, which are more varied and complicated and hence more difficult in treatment, and their *Uebersicht* in the present work is surely no improvement over the patch-work of the former treatise. While the *Syllabus* can probably be regarded as the expression of the clearest generalizations with reference to the relations of the higher plants, as a systematic arrangement of the cryptogams it is in many of its features unfortunate and in a few a lamentable failure.

L. M. UNDERWOOD.

A. Text-Book of Special Pathological Anatomy. By ERNST ZIEGLER. Translated and edited from the eighth German edition by DONALD MACALISTER, M.A., M.D. and HENRY W. CATTELL, M.A., M.D. New York, The Macmillan Company. 1896, '97.

Pathology in its modern sense is one of the youngest of the biological sciences, although its subject-matter ranks with anatomy in antiquity. No more rapid strides have been made by any department of biology than have marked the progress of pathology, and none has suffered greater transformation since the promulgation of the cell doctrine. It is to be remembered that it was a pathologist who formulated the doctrine *omnia cellula e cellula*. At the present time pathology embraces several fields more or less distinct, invading, in its persistent search for the prime causes of disease, the domains of botany, on the one hand, and zoology, on the other.

It seems to us natural to regard bacteriology as essentially a medical subject, although the number of species of bacteria of interest and known to the pathologist is but a fraction of those of which the botanist must take account. However, it is to the constant endeavors of the physician that the present relatively extensive knowledge of bacterial species and activities is to be ascribed. Without his quest for the cause of the contagious and infectious diseases, bacteriology as a science would scarcely exist to-day. In the same way the lowest animal forms will receive a new interest and meaning, and there will arise a new impetus to their study, so soon as more diseases are traced to them and improved technical means make it possible to control their investigation, as can now be done with the bacteria.

A fair idea of the progress of pathology can be gained by comparing the two English editions of the text-book under consideration, the first—that which appeared in 1884—with the present one. The main difference is not found in the greatly increased volume of the latter, but in the altered points of view and the definiteness of the one as compared with the other. Pathology, like other natural sciences, has been characterized, in its growth, by two stages—one the acquisition of data, and the other the orderly arrangement and classification of the accumulated facts. Workers all over the world are still busy collecting data and verifying, where possible, their observations and conceptions by experimentation under known conditions. The animal organism is exposed to so many influences of injurious nature—some generated within and others applied from without the organism—that there seems no end to the variety and complexity of the phenomena met with. Notwithstanding this fact, the complex problems of inflammation, new tissue formation, the causes of destructive lesions in liver, kidney and brain, are beginning to be understood no less than the diseases, such as tuberculosis, glanders and malaria, which are due to the invasion of microparasites into the body.

A text-book will of necessity be in the rear, never in advance, of a rapidly-growing subject. It fulfills its purpose, if it is a trustworthy record, in a convenient form, of the more important facts, and if it reflects the spirit of progress of the subject. This Ziegler's text-book has continued to do, improving with each successive edition, until now it has become one of the most useful books in any language. The rapidity with which it goes through editions is testi-