

Chapter V. is concerned with "The Induction Balance of Hughes"; and here, for the first and last time, we encounter the name of Joule, who appears as the discoverer of the elongation of iron in a magnetic field. This is, of course, thoroughly accurate; but why, we naturally ask, is there no mention of Joule's Law of the heating accompanying conduction of electricity? The whole question of resistance is, indeed, barely touched. It is difficult to imagine by what process of reasoning such an important subject is omitted in a book which positively bristles with laws and principles named after their discoverers.

This method of cataloguing physical laws—for it is little else at times—has its advantages, especially from an examinee's point of view. It is doubtful, however, if it can be carried out consistently. Prof. Mombello certainly has not done so, although in the majority of cases he seems to be historically sound. One objection to the method is that, as it is impossible to group physical principles, like geometrical propositions, in a logical series, and as physical principles belong to different axiomatic, experimental, or hypothetical grades, there is a strong tendency, in a compendium of the kind we are reviewing, to present these principles in a false perspective. There is no doubt, however, that Prof. Mombello has placed in the hands of the countrymen of Galilei an instructive and suggestive treatise bearing on the varied phenomena of molecular physics. There is editorial carelessness in the spelling of foreign names, and serious faults of omission of the character discussed above. But the teaching is in general sound, and Part V. fitly closes with an account of Maxwell's electromagnetic theory of light, and a discussion of the character of the ether.

C. G. K.

THE MICROSCOPE IN THE CLASS-ROOM AND LABORATORY.

The Microscope and Histology for the use of Laboratory Students in the Anatomical Department of the Cornell University. By Simson Henry Gage. Third edition. Part i. (Ithaca, New York, 1891.)

THIS is a practical handbook by a thoroughly practical histologist. It is an expansion of an earlier and more concise treatise, written not for the amateur and the dilettanti, but for the laboratory student.

The recognition of the need of such a handbook is in itself an evidence of the practical character of its author, and of his knowledge of the wants of the serious student. To follow intelligently the best and most suggestive histological teaching requires more than a passing or perfunctory knowledge of the use of the microscope; and this can only be really acquired by those who have at least an elementary knowledge of the principles upon which this now really complex instrument is constructed. It has become an instrument of precision, and precise methods must be adopted in its use. This does not mean that it is more difficult to use than it was in the early years of the last quarter of a century; but it only implies that the principles upon which it is to be successfully employed should be thoroughly understood and practised.

Thus the apochromatic system of lens construction is an immeasurable gain, an improvement so great that its amount cannot be exaggerated; and these lenses are, if anything, rather easier to use than those of the older achromatic construction; but if the principles of their construction, and consequently the principles involved in the employment of them, be not understood and carefully practised, they yield results entirely unsatisfactory.

Again—and this is a point not referred to by Prof. Gage—those who may be provided with a good battery of achromatic lenses, and do not desire to face the cost of changing these for a series of apochromatics, may come wonderfully near the best results of the finest apochromatic objectives by the use of real monochromatic light. To obtain this with complete certainty, using any monochrome of the spectrum we may desire, with good lamp-light, is now not only possible, but easily within the reach of all, and in such a manner as to lend itself to employment with the condenser and any magnifying power it may be needful to apply; and by this means not only is a good achromatic lens, as it were, elevated optically into an "apochromatic," but its numerical aperture is increased—the great desideratum, all else being equal, of good optical performance.

These are indications enough to emphasize the importance to the medical student generally, and to the histological student in particular, of a book that will briefly and accurately give him a knowledge of the principles involved in the construction and employment of the microscope, upon his intelligent use of which so much depends, but to which, as a rule, so little time is devoted, and therefore so little knowledge is possessed.

We do not for a moment suppose that a treatise like this, however well conceived and carried out, can give efficient, to say nothing of exhaustive, knowledge of optical theory, principles, and the laws and conditions of construction so as to enable a student to become in this sense a master of microscopic manipulation and interpretation; but it will go far to enable him to go through his work as a student with an intelligence and insight otherwise unapproached; and what is still more important, it will give him the opportunity of acquiring ability to see in the preparations he is instructed to make, or which he is required to study, or which he makes of his own initiative, that which he is *not* directed to look for, and which may open up for him and his science new and important paths. But this cannot be done if the student is not, in a strictly scientific sense, using his instrument, and is therefore approximately certain of the propriety of the interpretation of what he has been able to make out in his preparation.

Prof. Gage has adopted a system of illustrations (which we think might have been of a more refined artistic character, with much advantage) which are concisely and in the main accurately explained, and are intended to cover the entire subject; definitions, descriptions, and textual illustrations are added, which, taken together give a completeness to the treatise, that thoroughly fit it for its intended purpose. In many points it is as a matter of necessity, from its very nature, inefficient. It can only indicate, and not exhaustively explain, many most important points. But to the intelligent student alive to his subject, these are but spurs to

further reading; and the larger treatises, giving full explanations of the matter in hand, will not be long unread. In short this treatise lays the foundation for a thorough microscopical training, entirely adapted to the wants of medical students.

It is printed only on one side of the page throughout, so that the blank page is open for notes, and by using the opportunities presented with wisdom, the book may acquire, in the hands of an industrious student, a doubled value.

We may note that there are some points that even with the restricted object of the book we think might have received fuller, or even more accurate treatment. A fuller treatment might certainly have been given to the subject of "oblique light," which is very lightly touched; but which is none the less, to the partially instructed, whether medical student or ordinary amateur, one of the most prolific and frequent sources of erroneous judgment and entire misinterpretation; and we believe that no treatise on microscopic work, whatever its object, can be thoroughly efficient without giving it grave and careful consideration.

On the other hand it would have given greater value from the point of accuracy if the details given for the "Centring and arrangement of the Illuminator," by which is meant the sub-stage condenser, had been of a somewhat later period. On the use—the right use—of the condenser much of the best English work of the past quarter of a century has been spent. Happily German microscopists and opticians have during the past seven or eight years begun to perceive the value, nay, indispensable importance, of this apparatus, and the firm of Zeiss have, through Abbe, made successively chromatic, and subsequently achromatic condensers of increasing value. We trust they may be induced to follow English opticians and make apochromatic condensers, especially one adapted in numerical aperture to their latest optical triumph in lenses, viz., that possessing a N.A. of 1.60; the full value of which as an apochromatic objective can never be seen without it. It is a pleasure to note that Prof. Gage tells us that "for *all* powers, but especially for high powers," the condenser is of "great advantage." We believe it for the highest results, even with "low" powers, to be indispensable. But it will never be by the employment of "a pin-hole diaphragm . . . put over the end of the condenser" so that this aperture shall appear in the middle of the field, that the best possibilities of the condenser will be reached. The student is plainly told that the "optic axis of the condenser and of the microscope should coincide," but the best way of securing this coincidence is certainly not stated.

The blemishes of the book are nevertheless few, it has a decided purpose, and there is a large sphere for its action. We believe that another edition will not long hence be called for in which its author will not find it difficult to emend and expand it in certain parts, and possibly still further to enlarge it, and we will add that we think it may not only prove of value to the students in the Anatomical Department of the Cornell University, but also to others on both sides the Atlantic.

W. H. DALLINGER.

OUR BOOK SHELF.

An Elementary Text-book of Magnetism and Electricity.

By R. Wallace Stewart. Univ. Corr. Coll. Tutorial Series. (London: W. B. Clive and Co., 1892.)

IN this work Mr. Wallace Stewart presents us with another of his excellent text-books on elementary science. Just as his treatment of the subject was concise and clear in his book on heat and light, so here he has followed the same lines, and has placed before the student, especially one who is preparing for the matriculation examination of the London University, a course in magnetism and electricity which will give him a thorough knowledge of the subject and a sound basis on which to make further study. The illustrations and diagrams will be found to form a valuable addition to the text, while the numerous examples at the end of each chapter, if thoroughly worked out, should give a student a good insight into the art of solving problems.

Key to Arithmetic for Beginners. By J. and E. J. Brooksmith. (London: Macmillan and Co., 1892.)

THIS key will be welcomed by all those who are employing Mr. Brooksmith's excellent arithmetic. It has been prepared especially for the use of teachers, who will find it a valuable aid in their work, but no doubt it will be largely demanded by those who are studying this subject for themselves, for much may be learnt by a judicious use of such a book. The examples, so far as we have been able to see, have been very carefully and concisely worked out, and many difficulties that usually arise have here received careful attention.

LETTERS TO THE EDITOR.

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International, Geological, and other Records.

MY friend Mr. Minchin's letter has opened a question that I have been ruminating for a very long time. We occasionally hear of the organization of science, but the very ABC is at present neglected, or carried out in a spasmodic and disjointed manner. Let us take for example geology. We have several attempts at a catalogue and review of its yearly literature, of which I give the following examples. First comes the "Geological Record," a publication very well in its way, but making its appearance at irregular intervals, and often much behind time. We have in Prof. Blake's Annual the attempt of a single individual to cope with a mass of literature that it is impossible for him to read, and treating of questions that no single person is or can be qualified to deal justly with. The very obvious result of this is careless reviewing, and general dissatisfaction of most authors whose papers are submitted to the abstracting process. I hope Prof. Blake will not take these words as a disparaging appreciation of his attempt, which I think does him much credit as a single-handed worker, but it will not satisfy the geologists in general. Next we have the "Annuaire Géologique Universel," for which great credit is due to Drs. Carey and Agincourt. Here we have the geological literature of each country treated separately, followed by a subject literature. Each article is compiled by a specialist in his own branch, and one who is able to form a just opinion of the work and appreciate the salient points of it. Altogether the organization of the "Annuaire" is on the right lines, but I understand it is not a financial success, and I have very grave doubts if it will continue, because the supporters of one publication cannot be the supporters of several. The motto "L'union fait la force" is as true in this case as in any other. Then again there is not that official character about it that there would be with international co-operation, supported by governments, scientific societies, &c. As two years' collaborator for the subjects of seismology and