catch, and it is very hard to get him to see how to express it in any but the simplest case. On the other hand, we have no clear notion of Force at all until we master it, and statics without that idea is a series of barren propositions, which stand to real life much in the same relation as a "uniform, weightless, perfectly rigid, straight rod" does to a real bar. M. Fernet accordingly places this conception at the commencement of his book, and we find the laws of uniformly accelerated motion given before the discussion of levers and centres of gravity.

It is extremely easy, and perhaps a little ungracious, to select for notice points the omission of which causes surprise even in an elementary work of 800 pages. The need of compression, which constrains an author who has to treat in one volume mechanics, hydrostatics, pneumatics, light, heat, sound, electricity, magnetism, and meteorology, is so great, that it is impossible to question too loudly the prudence of obvious omissions. But we should have expected to find a little discussion of the adhesion of liquid plates to the solids which they wet, and to each other, ; and one would willingly excuse the absence of the regulation picture of the balloon and its car, with the accompanying history of the brothers Montgolfier, for an account of the mercurial air-pump of Sprengel or Jolly. M. Fernet is perhaps a little open to the charge which is constantly brought against the scientific men of his country, that if they read anything but the science of the *Comptes Rendus* and the *Annales de Chimie et de Physique*, they never indicate the fact by a line or an allusion. M. Verdet alone, of well-known French scientific writers of our time, knew German and English as well as French science, and showed that he knew it. We should scarcely have found any book of his on the subject of heat, without any reference—as far, at least, as I can find—to Joule's principle of the equivalence of mechanical effect and heat, of the "mechanical equivalent" by which the one may be converted into the other, or of the fraction of the heat which can be converted into work by a perfect heat engine.

So far as it goes, in fact, the book is extremely clear and satisfactory; but it gives one less impression of a complete working up of the subject to the latest date than we had expected to find in it. Take for instance the well-known series of experiments by which Kundt established the velocity of sound in tubes of different materials. They were explained by Tyndall in this country a couple of years since, and it is impossible to conceive any which make more visible to the student those vibrations of bodies which he is constantly required to admit in the course of his reading on acoustics. The omission of all mention of the famous "singing flames" is more defensible from a purely scientific point of view, as the experiments scarcely admit precise measurements, and can only be relied on to convince any one who needs convincing how many astonishing things there are within the range of the science.

M. Fernet has given a considerable number of notes, in which there is a precise mathematical treatment of the statements in the text. We should be glad to see the plan followed more frequently in elementary treatises. In a book, the introduction of simple mathematics in a note does not distract the attention of the reader who is frightened even by a simple equation, and it gives precision to statements which can scarcely be fixed without them, or without a long and extremely tedious paraphrase. We are more doubtful of the advantage of a practice common in France, and which has crept into some English books; the introduction into the text of *notes non exigées*. These are parts which the student who is preparing for a special examination may omit if he chooses. The text of a book of this kind ought, it seems to us, to be either one thing or another—to be composed with a perfectly definite object, and to be one and indivisible. As it is, it produces something of the impression that is given occasionally when a single picture is used to illustrate two different propositions. The lines which belong to the first get so mixed with those of the second, that the student can follow neither. A book too full of *notes non exigées* is apt to be too little systematic and scientific for the more advanced student for whose benefit these notes are inserted, and to be made too difficult for the simpler readers whose wants are mainly kept in view. WILLIAM JACK

OUR BOOKSHELF

Cryptogames Vasculaires du Brésil. Par Prof. A. L. Fée avec le concours de Monsieur le Dr. Glaziou. Pp. 268, 4to., 78 Plates. (Paris : Baillière.)

PROFESSOR FEE is by many years the oldest amongst living fern-authors. He has held for more than a quarter of a century the chair of botany at Strasburg, and has concentrated his attention principally upon ferns and the other allied higher orders of cryptogamic plants. He published a general treatise upon the classification of the order as long ago as 1844, and since then many consecutive years have never passed without producing some memoir upon the subject from his fertile pen. Having recently received a fine collection of ferns from Dr. Glaziou, the superintendent of the Botanic Gardens at Rio Janeiro, he has been stimulated to add one more memoir to the series, and that is the work now before us. All the series of his monographs, several of which are in folio, are illustrated beautifully and copiously, not only with full-sized figures of the plants, but also with careful magnified analytical details ; and together they form by far the most extensive and excellent series of fern-plates which anyone upon the Continent has published. The present memoir is quite upon a par with its predecessors in this respect. It is in quarto, and contains seventy-eight quarto plates and a list of all the ferns and fern-allies known to the author as inhabiting Brazil, with a list of special stations, but with descriptions of novelties only. But there is one drawback to the value of Fée's works, and that is a very great one. Living at a distance from the great metropolitan herbaria, our author has apparently worked almost entirely upon his own private collections, and has continually failed to recognise well-known plants, and has made new species in great numbers out of the specimens which his correspondents have sent him, which no one else has been able to understand as such. In none of his works—we have no alternative but to say—has this tendency been carried to a greater excess than in the present one. For Brazil alone he describes and figures in the present memoir upwards of 180 new species, so called. These are not from tracts of country which the collectors whose gatherings have been already reported upon have not visited, or have left unexplored, but nearly all from the vicinity of the capital, and from the gatherings of Glaziou. Now the neighbourhood of Rio Janeiro is exceedingly rich in ferns; but there is, perhaps, no other part of Tropi-

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cal America from which herbaria, both in England and on the Continent, have been more bountifully supplied. The consequence is, that out of this 180 we do not think that more than from twelve to twenty species are really new, in any sense in which we understand in this country what is meant by a species. For instance, we have some seven or eight species elaborately characterised and figured from what cannot be called anything else than so many individual fronds of that most cosmopolitan of ferns, our common English *Aspidium* or *Polystichum aculeatum*. Or, to take one of the exclusively Brazilian species, *Cyathea Gardneri*, a very distinct tree-fern, is included in the list under five different names—*Gardneri* (Dr. Gardner's number on which Hooker described the species quoted), *incurvata* (a name of Kunze's published in the Linnæa from Regnell's specimens), *mamillata*, *taunaysiana* and *attenuata*, the last three new species here named and figured for the first time; but the figures, beautiful as they are, might, any of them, have been drawn from Gardner's specimens. The author does not seem to have any knowledge of numerous English and German books and papers in which Tropical American ferns are described, as for instance, Grisebach's excellent Flora of the British West Indies; and this leads to further name-crossing. In short, although one cannot but admire the excellence and the copiousness of the illustrations in these memoirs, and ought not to leave out of sight the example of devotedness to science which they show, expenditure of time devoted to one object through a long course of years, and of money, only a very small proportion of which their sale can possibly repay, yet still the predominant feeling on the mind must needs be that to deal with plants in this way has a direct tendency to bring species-botany at a very rapid rate into a state of utter confusion.

J. G. BAKER

The Laboratory Guide. A Manual of Practical Chemistry for Colleges and Schools, especially arranged for Agricultural Students. By A. H. Church, M.A., Professor of Chemistry in the Royal Agricultural College, Cirencester. Second edition, enlarged and revised, pp. 170. (London: Van Voorst, 1870.)

THIS little book, as its title indicates, is intended mainly for the use of students of agricultural chemistry, and we fear it might cause disappointment to anyone who wished to employ it as a guide to general analysis. The science of chemistry is so rapidly increasing, that it would seem almost hopeless, at the present time, to give students a complete knowledge of chemistry and leave them to apply their information to the special subject they intend to follow. Professor Church's book is intended to obviate this difficulty, and after a few introductory lessons of universal application, the student commences experiments on materials with which he is certain to come in contact in agriculture, such as superphosphate, milk, soils, &c. Part I. treats of chemical manipulation, and consists of a number of lessons intended to accompany the course of lectures, and from which the student will learn the mode of performing some simple operations, as solution, filtration, crystallisation, specific gravity, and will become acquainted with the modes of preparation and properties of the principal elements and compounds. Each lesson commences with a list of the apparatus required, the ordinary reagents, and the special materials and tests necessary for the performance of the experiments, which are detailed with great clearness. This arrangement is calculated to cause the student to be careful to have everything ready before commencing work, and will thus save him much time and inconvenience, for few things are more likely to endanger the success of an experiment than leaving it at a critical moment in order to obtain some piece of apparatus or reagent which should have been previously prepared. Part II. treats of qualitative analysis, of which Chapter I. deals with the elements, reagents and tests, and reactions; and here we find the terms univinculant, bivinculant, trivinculant, &c., as equivalent to monad, dyad, triad, &c. The principal distinguishing characteristics of the different groups of elements are here given. The section on reagents and tests will be found useful, for it contains the modes of testing for impurities, and indicates the strength of the different solutions employed, two things to which attention should always be paid. The second chapter of this part describes the methods of qualitative analysis, all rare elements and those with which the agricultural student is not likely to meet being omitted. The third part is devoted to the general processes of quantitative analysis, and the fourth to the examination of manures, soils, water, and food. This book will doubtless be invaluable to agricultural students, besides being useful to those requiring special information on the subjects of which it treats. The appearance of such a work is a satisfactory indication of the extension of the application of scientific chemistry to the useful arts.

The Book of the Roach. By Greville Fennell (of the *Field*). 16mo. pp. 118. (London: Longmans and Co. 1870.)

WHILST Mr. Pennell has instructed us in catching *lege artis* all the various fish in British rivers and lakes, Mr. Fennell has been content to devote a little volume to the natural history and fishing of the Roach. Let no one smile at the man in the punt with his humble notions of enjoyment. Maybe he has been toiling hard the whole week in the noisy, murky town; the quiet sport of the Saturday afternoon suits his purse exactly, and there will be real enjoyment over the dish of fried roach "caught by father." Nay, if we could measure the amount of pleasure, healthy recreation, and renewal of vigour obtained by the multitude in the unpretentious sport of roach-fishing, and compare it with that sought for by the select few who have the privilege of finding their amusement on a salmon river, we should probably find the balance very much on the side of the former. No apology, therefore, was needed from Mr. Fennell for the publication of his little book on the Roach. He has divided it into eight chapters, of which the first two are devoted to the natural history of this fish, and the five following to a description of the tackle and various kinds of baits, and to the methods of roach-fishing generally as well as at certain localities. In the last chapter hints are given on the roach as an article of food, on the method of cooking, &c.

A. G.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.*]

Hypothesis regarding the Corona

HAVING read in Nos. 34 and 35 of the valuable periodical NATURE (of June 23 and 30) the two articles about the Corona, I beg leave to direct your attention to an hypothesis concerning its nature, and especially the origin of the *beams*, which I sent to the Physical section of the Amsterdam Academy of Sciences, of which I have the honour to be a member.

I have just received No. 1776 of the *Astronomische Nachrichten*, for October 15, where the American astronomer, Dr. Gould, in a notice regarding the total eclipse of the sun of August 7 (1869) says:—

"Of the Corona I made some hasty measurements both with the telescope and without it. Its form varied continually, and I obtained drawings for three epochs at intervals of a minute. It was very irregular in form, and in no apparent relation with the protuberances of the sun, or the position of the moon. Indeed, there were many phenomena which would almost lead to the belief that it was an atmospheric rather than a cosmical phenomenon. One of the beams was at least 30′ long."

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